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Muelleria

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150

1853-2003

NATIONAL HERBARIUM OF VICTORIA

Celebrating 150 years of plant research in Australia

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150 years: the National Herbarium of Victoria, 1853-2003

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Abstract

The National Herbarium of Victoria was founded with the appointment on 26 January 1853 of Victoria's first Government Botanist, Ferdinand Mueller. With a brief to investigate the local flora, Mueller worked assiduously to make the results of his work available to the public. Mueller's research concentrated on the discovery of the Australian flora. His successors as Government Botanist struggled with a lowered expectation on the part of government of the role of the Herbarium and inadequate resources. The collections were built from nothing into a world-class herbarium. In more recent times research programs have continued to document the Australian flora and some have expanded to take advantage of new research techniques.

In 1853 the colony of Victoria was enjoying an unprecedented level of prosperity, with burgeoning gold revenues and waves of immigrants seeking their fortunes. This young colony, less than 20 years old, had achieved a measure of independence in 1851 with the formal separation of the Port Philip District from New South Wales. The citizens now had a large degree of self-determination having, among other things, a partially elected parliament. Lieutenant Governor Charles La Trobe exercised an enlarged vice-regal decision-making responsibility. He and his civil administrators had the difficult job of establishing a public infrastructure that was capable of dealing with a rapidly enlarging population and its spread into uncharted parts of the country. Their vision was to ensure Victoria's long-term prosperity. It was in this climate that La Trobe appointed Ferdinand Mueller (Fig. 1a) as Victoria's first Government Botanist on 26 January 1853 and effectively founded the National Herbarium of Victoria.

Mueller was the third scientific officer to be appointed to a public office in Victoria. The first was the Government Geologist, Alfred Selwyn, appointed in London in August 1852. This was an obvious necessity in a colony where the overriding preoccupation was the extraction of gold from the ground. With his next two appointments La Trobe was able to combine his duty with his personal inclinations. Being himself a talented naturalist, La Trobe determined that the colony's floral as well as geological resources should be investigated. William Swainson was engaged by La Trobe in September 1852 for a term of one year to study the timber trees of the colony, particularly the Eucalypts. This was not a happy arrangement, Swainson failing to deliver any useful results (Maroske & Cohn 1992). La Trobe's other botanical appointment was an undoubted success.

Mueller arrived in Victoria from South Australia in August 1852 with an introduction to La Trobe and a burning ambition to write what he termed a 'universal flora of Australia'. As Government Botanist Mueller's brief was to study the indigenous flora of Victoria. Although he was a member of the Committee of Management of the Melbourne Botanic Gardens from 1853, the daily management of a botanic garden was not part of his responsibilities. Mueller was appointed solely on the responsibility of the local authorities. No equivalent appointment had been made in any of the Australian colonies to that time, making Mueller's appointment unique in Australia. In addition, Mueller was not a member of the British botanical establishment, the usual source of colonial botanical appointees. Rather, his training had been in northern Europe, a fact that later caused some disquiet on the part of the leading botanical luminaries in Britain. With this

background Mueller entertained no doubts that he was in a position to research the then largely unknown Australian flora. He did not view his role as that of gatherer of raw materials for others to work on back home. In his career in Victoria Mueller's continental contacts proved to be at least as important as those he forged with botanists in Britain.

1853-1896

Mueller enjoyed the position of Government Botanist for 43 years (Home *et al.*1998, 2002). He was untiring in his efforts to promote the study of the Australian flora. As a qualified pharmacist he had a particular interest in the investigation of plants for the benefits that could be derived, be they medicinal, industrial or agricultural. This was also, he believed, essential in a new colony that was still trying to find its feet. In his career Mueller described more than 4500 previously unknown Australian taxa. As a resident he became the acknowledged point of contact for botanists visiting Australia on their travels, for overseas botanists seeking information and specimens of the Australian plants, and for colonists wishing to enlarge their knowledge of the indigenous flora. He published extensively so that his discoveries could be known as widely as possible. With a small amount of government funds voted for the purpose, and utilising a wide range of botanical journals, Mueller issued a stream of articles and illustrated books on the Australian flora (Sinkora 1998). To his great disappointment he was unable to write what he termed a 'universal flora of Australia', bowing to pressure to cede the authorship to a botanist within the British botanical establishment. He then sent his entire Australian collection to Kew in stages. Without access to these specimens George Bentham would not have been able to write the *Flora australiensis* (Bentham 1863-1878). From 1857 to 1873 Mueller had the additional role of Director of the Botanic Gardens. His efforts to make the Gardens into the aesthetically pleasing and educative institution he believed they should be were ultimately at odds with some sections of the population. In 1873 the directorship was abolished to remove Mueller from the Gardens, a matter of enduring bitterness for Mueller (Cohn & Maroske 1996). The positions of Government Botanist and Director remained separate for 50 years.

When Mueller took up office, there was no government collection of dried plants. His first course of action was to make one. To this end, on 29 January 1853 he set out on the first of his three extended explorations of Victoria. His reputed delicate health notwithstanding, Mueller enjoyed a long career as explorer, bushman and collector. Although he was in the service of the government of Victoria Mueller had no thought of confining his botanical research to just that colony. On the contrary, he claimed as his field the whole of the continent. There were few parts of Victoria that Mueller did not visit with the purpose of collecting specimens. His field work extended into other colonies as well: the area around Brisbane and the Glasshouse mountains in Queensland; areas around Sydney and Twofold Bay in New South Wales; the south-west regions of Western Australia; and Tasmania. As botanist to the North Australian Exploring Expedition Mueller made the first collection of the flora from the inland of Australia.

As Government Botanist Mueller was in an excellent position to be the focus of botanical activities within Australia and became the authoritative voice on the indigenous flora. Plant collections made on official exploring expeditions in the other Australian colonies were sent to Mueller for identification. So too were the specimens gathered on private expeditions. Thus the collections of John McDouall Stuart, Eugene Fitzgerald, John and Alexander Forrest, Ernest Giles, the Victorian Exploring Expedition and the Elder Expedition among others all came to Melbourne. Individuals also sent him specimens, receiving in return encouragement to study the plants in their local areas. In this way a continued supply of new material was ensured. Advertisements were placed in newspapers seeking collectors, bringing private citizens such as Jessie Hussey from Port Elliot in South Australia into his network. Mueller's fellow botanists in other colonies, for

instance Frederick Bailey, William Woolls and Charles Moore, were enthusiastic correspondents and the source of many interesting specimens for Mueller. The necessity for a paid field collector was something Mueller continually urged upon the government, with mixed success. His longest-serving paid collector was John Dallachy who preceded Mueller as officer-in-charge of the Botanic Gardens in Melbourne. Sometimes others, Charles Stuart and Augustus Oldfield among them, were paid by Mueller from his own resources when his official budget had little or no capacity to pay collectors.

Mueller did not only utilise Australian sources for his specimens. He exchanged material with his overseas correspondents, happily sending duplicates of his Australian collections to institutions overseas. In return he received large numbers of specimens from other parts of the world, some as little known botanically as Australia. Some hundreds of Robert Brown's Australian collections were received in the dispersal of duplicates from London. By judicious purchases Mueller acquired the incomparable collections of Joachim Steetz (Short & Sinkora 1988) and Wilhelm Sonder and the personal herbarium of James Drummond (Short 1990). This brought to the Herbarium material from the earliest collections made in Australia as well as a broad range of exotic species. Mueller knew these were needed for comparative purposes if the Australian flora was to be properly elucidated.

Mueller's own collections, the specimens sent to him by his collectors from all over Australia, and the specimens he received from overseas amounted to the largest herbarium in the southern hemisphere. In 1894 he estimated the size of the Herbarium as over one million sheets (Mueller 1894). More importantly, the collections contained many types, and specimens from areas that have now been transformed as a consequence of European settlement and in some cases, for instance the Northern Territory, areas that have not been surveyed since. They therefore form an invaluable scientific and historical resource. Little serious taxonomic work can now be done on the Australian flora without reference to the Melbourne collections.

1896-1941

For the 50 years or so after Mueller's death the Herbarium languished in the doldrums. The staff declined to two people (other than the Government Botanist) whose duties centred around providing identifications particularly for the Department of Agriculture, and curation of the collections when time permitted. Development of the agricultural industries of the state were a priority for successive governments. The Herbarium was transferred to the Department of Agriculture in 1903, the better to facilitate the identification of weeds and stock-poisoning plants by Herbarium staff for Departmental officers and farmers. In 1913 the Herbarium was again transferred, back to the Chief Secretary's Department. The Herbarium's function of providing a plant identification service for the public benefit continued undiminished. Research as a primary herbarium function slipped off the agenda. It was as though having got a world class herbarium the authorities could only see one purpose for it. Mueller's repeated efforts to impress upon both public servants and government ministers alike what he considered a proper sense of the importance of the Herbarium had not borne fruit.

Mueller's successors reflected the importance placed on both the position of Government Botanist and the Herbarium by successive governments. Johann Luehmann (Fig. 1b) had served as Mueller's deputy and clerk since 1869 and received his botanical training under Mueller's tutelage. Although he was officially acting as Government Botanist from Mueller's death in office, Luehmann was not gazetted as Government Botanist and Curator of the National Herbarium until December 1900. It was during Luehmann's term as Government Botanist that the Herbarium was officially named the National Herbarium of Victoria. Luehmann was not the botanist that Mueller had been, having no strong vision of the research that should be done or the direction the Herbarium

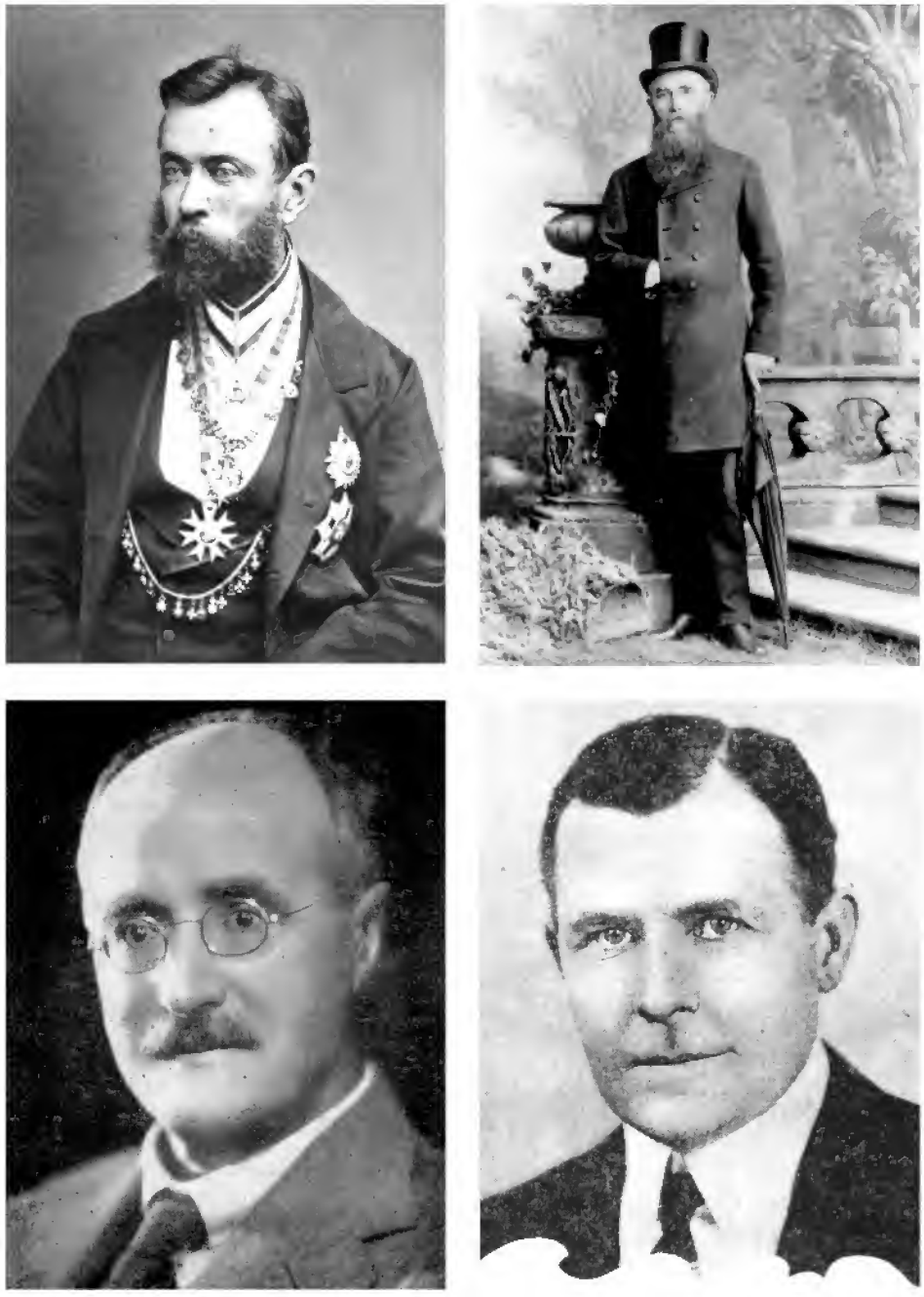

Figure 1. **a** (top left) Ferdinand Mueller, Government Botanist 1853-1896, Director of the Melbourne Botanic Gardens 1857-1873; **b** (top right) Johann Luehmann, Government Botanist 1896-1904; **c** (bottom left) Alfred Ewart, Government Botanist 1906-1921; **d** (bottom right) Frederick Rae, Director and Government Botanist 1926-1941 (reproduced with permission from the La Trobe Collection, State Library of Victoria).

should take. By now the Herbarium staff comprised only James Tovey, James Audas and Luehmann himself. His term of office was more of a holding operation, with which the government seemed quite happy. Luehmann died in office in 1904.

In Alfred Ewart (Fig. 1c), the Herbarium once again had a dynamic and ambitious leader. Recruited in London, and with a strong research background in plant physiology, Ewart threw himself into the work of the Department of Agriculture. He also engaged in some taxonomic work even though he had no training or previous experience in this field. His *Flora of Victoria* (Ewart 1931), although published 10 years after he left the Herbarium, was the first such work published since Mueller's *Plants indigenous to the colony of Victoria* (Mueller 1862). However, Ewart was only part-time as Government Botanist. While his mornings were spent at the Herbarium, his afternoons were spent at the University of Melbourne as the foundation Professor of Botany. His five-year contract for the joint positions was renewed twice, the second time with much equivocation on the part of the government. The government did not even consider the position of Government Botanist as being on the Public Service establishment. It was with some relief that in 1921 Ewart gave up the position of Government Botanist and became Professor on a full-time basis.

William Laidlaw [no portrait available] was Biologist with the Department of Agriculture and had never worked in a herbarium. He nevertheless succeeded Ewart as Government Botanist. During his short tenure the Herbarium continued as it had for the past 25 years. In 1924 Laidlaw found himself having to take on the responsibilities of Director of the Botanic Gardens. Being close to retirement this was not what he had wanted. In Laidlaw the two positions were reunited for the first time since 1873. As the Botanic Gardens were under the Department of Crown Lands the Herbarium now changed departments again. Laidlaw did not live long enough to enjoy either his new role or his retirement. He died in office in 1925. The relative importance placed on the Gardens and the Herbarium was apparent with the next appointments to the position of Director and Government Botanist. Frederick Rae (Fig. 1d), Alex Jessep (Fig. 2a) and Dick Pescott (Fig. 2b) all came to the position after some time on the staff of the School of Primary Agriculture at Burnley. Both Rae and Jessep were Principal immediately before coming to the Herbarium and Gardens. The mild controversy that attended Rae's appointment was more about the powers of the Public Service Board than whether Rae was the most appropriate of the applicants, all horticulturists.

Rae had charge of the Herbarium during perhaps the most difficult times any public administrator had to face. It is doubtful that anyone could have done better coping with the stringencies engendered by the great depression. So hard were the times that salaries, including that of the Director, were cut by up to 20 per cent. Funding problems were not new for the Herbarium. In the early 1870s and again in the 1890s Mueller struggled with budget cuts when the staff faced dismissal or transfer to other departments. Under Rae the Herbarium still had only two staff, James Audas and Frank Morris. Rae was not expected to undertake any taxonomic research and he did not do so. He did, however achieve two things that greatly affected the future of the Herbarium. The first was the construction of a new Herbarium building within the Gardens, using funds generously donated by Sir Macpherson Robertson. In 1934 the collections made their way across Birdwood Avenue from Mueller's now extremely cramped Herbarium (Fig. 3a) to their new commodious accommodation (Fig. 3b). This building now serves as the research and administration centre for the Herbarium and Gardens. Rae's second achievement was to appoint to the Herbarium a university-trained botanist and its third staff member, Jim Willis (Fig. 2c). In the latter years of Rae's tenure he suffered increasingly from ill-health.

Upon Mueller's death in 1896, the collection building program virtually came to a halt. For the next 70 years or so accessions to the collections dwindled to a trickle. The governments of Queensland and New South Wales now both had botanists on staff and so the Australian public had two centres other than Melbourne to which they sent their

Figure 2. **a** (top left) Alexander Jessep, Director and Government Botanist 1941-1957; **b** (top right) Richard Pescott, Director and Government Botanist 1957-1970; **c** (bottom left) James Willis, Acting Director and Government Botanist 1970-1971; **d** (bottom right) David Churchill, Director and Government Botanist 1971-1992.

specimens. Melbourne's position as the focus of Australian botany could not be sustained. Herbarium routines changed such that specimens sent for identification were rarely retained. This fruitful source of specimens was hence largely untapped and valuable information lost. By their own efforts, using their weekends and vacations, the Herbarium staff valiantly continued the practice of field collecting.

Of great importance was the connection with the amateur circle of botanists and collectors, many of whom were members of the Field Naturalists Club of Victoria. Herbarium staff have been enthusiastic members of the Club from its inception in 1880. This association resulted in the accession to the Herbarium of significant collections at a time when there was little official capacity to enlarge the collections. Carl Walter, Norman Wakefield, Thomas Hart, Bill Hunter, Charles Sutton, Keith Rogers and Herbert Williamson are among those who were closely associated with Herbarium staff and whose personal collections are now in the Herbarium. In particular Jim Willis formed a strong link between the Herbarium and the Club.

1941-2003

Alex Jessep (Fig. 2a) came to the job upon Rae's death in the middle of World War II. Although Jessep recognised that both the Herbarium and Gardens needed an injection of staff and funds, this of necessity had to be a long-term program. Among the first problems he had to face was the need to vacate most of the ground floor and the library on the upper floor to make way for the air force as part of the war effort. Jessep's main interest was in horticulture and he enjoyed a high reputation for his work on camellias and roses. This did not mean, however, that he overlooked the needs of the Herbarium. A priority, he considered, was to issue a botanical journal in which the research results of the staff could be published. In this he had as an example Mueller's *Fragmenta phytographiae australiae* (Mueller 1858-1882). With financial support from the Maud Gibson Trust, the first issue of *Muelleria* was published in February 1956. Under Jessep three more botanists joined the Herbarium: Ray Smith, Arthur Court and Helen Aston.

Dick Pescott (Fig. 2b) was an entomologist and spent 13 years as Director of the National Museum of Victoria before his appointment to the Herbarium and Gardens. He was able to bring to the role a background in taxonomic research and its administration. In continuing Jessep's work, Pescott campaigned even more strenuously for the resources to rebuild the Herbarium's research program. With encouragement from Pescott, Aston started research on the aquatic flowering plants of Australia with the intention of producing a book on these plants, the first such work published in Australia (Aston 1973). Lichenologist Rex Filson joined the staff in 1964, the first time a botanist specialising in cryptogams had been employed in any Australian government herbarium. Since then the Herbarium has continued to have at least one cryptogam specialist on staff. More recently, in 1994, Tom May joined the staff, the first mycologist employed with any Australian state herbarium. Pescott was also instrumental in ensuring that Willis's *Handbook to plants in Victoria* (Willis 1962, 1973) was published as a successor to Ewart's *Flora of Victoria* (Ewart 1931). By the time David Churchill (Fig. 2d) became Director and Government Botanist, Pescott's efforts in this respect had been largely successful.

Churchill was able to build on this by starting a vegetation survey program, then a neglected part of the Herbarium's work. Paul Gullan was appointed in 1975 to head this program, starting with surveys of the Gardens' annexe at Cranbourne and the Upper Yarra catchment area. The scientific aspects of the Gardens' horticultural programs were revitalised with the appointment of two Horticultural Botanists: Peter Lumley and Roger Spencer. A direct result of this was the publication of the *Horticultural flora of south-eastern Australia* (Spencer 1995-2002), the first publication of its kind in Australia. Other botanists were appointed whose research was directed to specific families. Field collecting became more directed to supporting those programs. This was particularly the

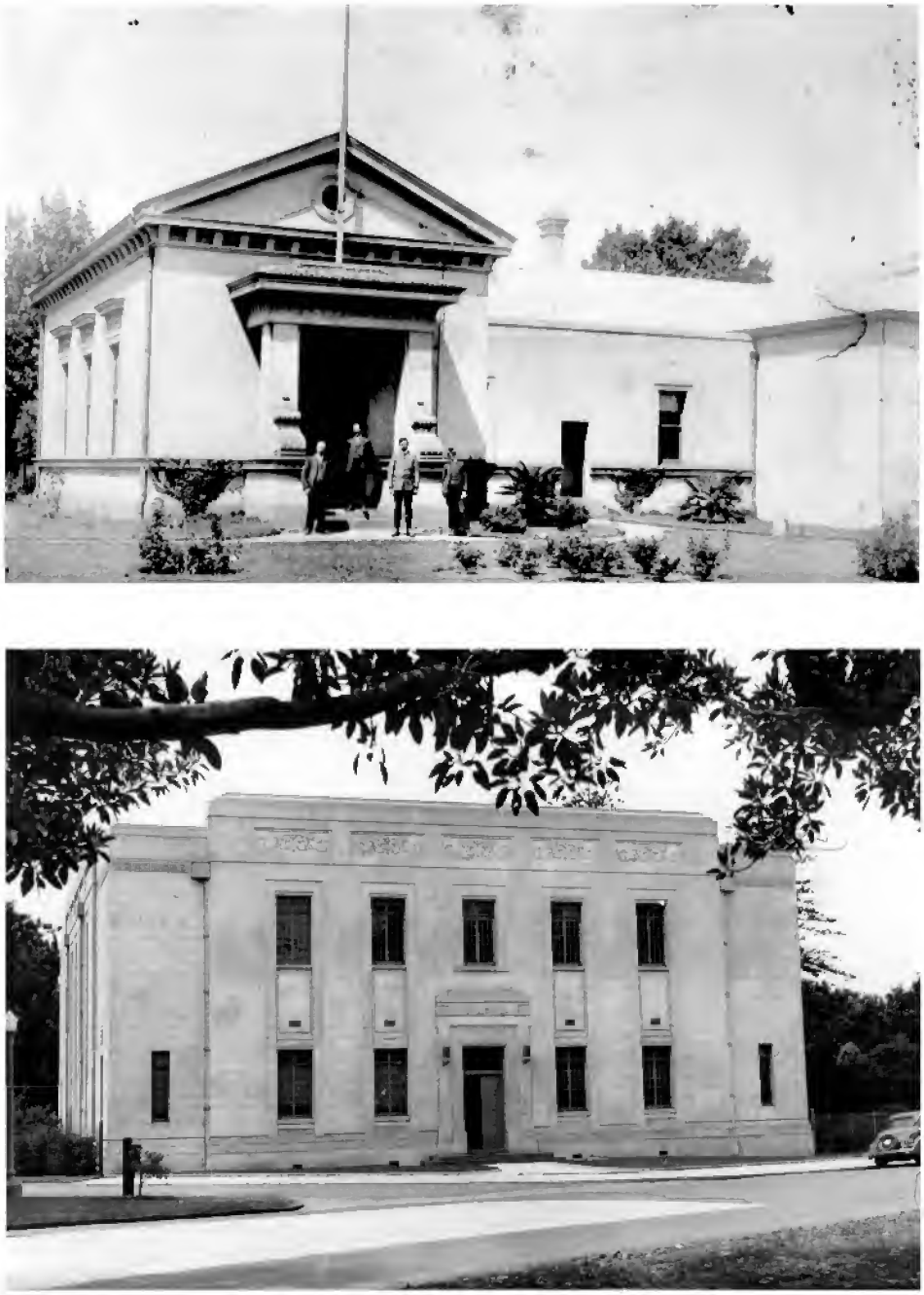

Figure 3. **a** (top) The Herbarium building in 1900, showing the original building of 1860 and the two extensions; **b** (bottom) The new Herbarium building, 1934.

Figure 4. The 1988 extension to the Herbarium building of 1934.

case when deficiencies in the collections were identified. By now the 1934 building was proving inadequate for a modern research institution. Churchill set in train the process that resulted in a three-storey extension being built in 1988 to accommodate the Library and collections (Fig. 4).

In 1985 the government amalgamated the Department of Crown Lands and Survey with the Ministry for Conservation and the Forests Commission to form the Department of Conservation, Forests and Lands. This had a profound impact in the Herbarium and Gardens. A high degree of anxiety was felt by the staff when all positions were declared vacant and people invited to reapply for their own positions. The survey team was transferred to the Arthur Rylah Institute for Wildlife Research. For a time the Herbarium was separated administratively from the Gardens. All the Department's technical staff, including those at the Herbarium, were pooled into a central technical support group. The Herbarium Assistants were thereby separated from the botanists who directed their work. In this enlarged department, the priority accorded the Herbarium and Gardens in the departmental scheme of things was of a similar level to that which it endured 60 years earlier. The position of the Herbarium and Gardens in a department where the main emphasis lay with the management of crown lands and forest resources was increasingly questioned. In 1992 the problem was resolved by the appointment of a board of management under the *Royal Botanic Gardens Act* of 1991.

Under the *Act* the Director reports to the Board. The Herbarium is a constituent part of the Royal Botanic Gardens Melbourne while the Government Botanist, now styled Chief Botanist, reports to the Director. Jim Ross (Fig. 5) became Chief Botanist in 1992, having been Manager of the Herbarium since 1986. The botanists, the collections and the Library were formed into the Plant Sciences and Biodiversity Division (Fig. 6a). To ensure the protection of the specimens and library collections, they were designated the State Botanical Collection under the *Act*. The last decade has been a time of unprecedented development for the Herbarium. Staff numbers increased, not least because of research grants made by the Australian Biological Resources Study for research towards the *Flora of Australia* and the *Fungi of Australia*. Herbarium programs have also been expanded

Figure 5. James Ross, Chief Botanist 1992-present.

with money from many other funding bodies. A major achievement was the publication of the illustrated four-volume *Flora of Victoria* (Foreman & Entwisle 1993; Walsh & Entwisle 1994-1999). Research took a strongly conservationist direction, being concerned with rare and endangered plants. Significant appointments here are Neville Walsh, Senior Conservation Botanist, Elizabeth James, Conservation Geneticist, and Frank Udovicic, Molecular Systematist. A new laboratory was equipped to undertake molecular analysis of plant material. Collaborative programs were initiated with researchers in other institutions including Victoria's universities. Notable here is the Mueller Correspondence Project, a joint venture with the Department of History and Philosophy of Science at the University of Melbourne to edit and publish Mueller's correspondence (see Homes *et al.* 1998, 2002). External funds had allowed the Herbarium to offer fellowships, to attract botanists to the Herbarium for periods of up to three years. The Herbarium assumed a role in the training of future botanists. In association with tertiary institutions, Herbarium botanists act as joint supervisors of honours and higher degree students. Jim Willis Studentships, funded by a private donor, are offered to students finishing their undergraduate degrees to enable them to gain some taxonomic training.

Curation of the collections, for many years rather neglected because of lack of resources, was given a high priority. The responsibility of being custodians of these invaluable resources is taken seriously by the Herbarium staff. Using external funds the Herbarium undertook an ambitious project, the John T. Reid Project, that saw the label data associated with all specimens in four large families recorded electronically (Fig. 6b). Access to the wealth of information contained within the specimen was greatly enhanced. Most of the staff engaged on this Project continued with the Herbarium when state and commonwealth funds were made available to all Australian state and commonwealth herbaria as part of Australia's Virtual Herbarium project to ensure all their specimens were databased. Australia's Virtual Herbarium is expected to be completed by 2007.

When Mueller began his work as Government Botanist he had a clean slate. The resources he built up and the research he published are a legacy that has been relied upon

Figure 6. **a** (top) Plant Sciences and Biodiversity Division staff 1997: (left to right) Helen Cohn, Cheryl Edwards, Elizabeth James, Katherine Patterson, Simon Lewis, Helen Jolley, Geraldine Jones, Tom May, Joan Thomas, Josephine Milne, Jenny Tonkin, Marco Duretto, Jim Ross, Su Pearson, Cathryn Coles, Roger Spencer, Jill Thurlow, John Westaway, Tim Entwisle, Rob Cross, Peter Neish, Mali Moir, Neville Walsh, Enid Mayfield; **b** (bottom) Collections Branch and John T. Reid Project staff 2000: (left to right) Helen Rommelaar, Pembe Ata, Valentine Stajsic, Rita Macheda, Wayne Gerbert, Helen Barnes, Martine Paull, Elizabeth Naganowska, Linda de Veer, Doris Alfaro, Jill Russell, Catherine Gallagher, Cathryn Coles (Photo: Wayne Gebert).

by his successors at the National Herbarium of Victoria and by those studying Australian plants. The Herbarium suffered a long period when its work was little more than providing an identifications service and the resources to support its work were minimal. In the past 50 years, the Herbarium has undergone a resurgence under the leadership of successive Government and Chief Botanists. Both professional and technical staff numbers were increased and the research program revitalised. Mueller's work was directed towards the discovery of the indigenous flora and its relationships. The Herbarium's research programs now continue Mueller's work, with increased emphasis on conservation. Documentation of biodiversity and determination of floral relationships remain central in the Herbarium's research in systematics, conservation and horticulture. In this, the 150th year since the establishment of the National Herbarium of Victoria, we can reflect on the many achievements of the Herbarium's dedicated staff.

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Ranunculus amplus (Ranunculaceae) a new stoloniferous species from Victoria

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Abstract

Ranunculus amplus N.G. Walsh & B.G. Briggs is described and illustrated. It is a robust stoloniferous species, of aquatic or moist habitats in southern Victoria. It has a restricted distribution and is threatened (if not extinct) in at least part of its range.

Introduction

A new aquatic or semi-aquatic species of *Ranunculus* native in Victoria has been distinguished and is described here so that it can be included in the treatment of Ranunculaceae for the *Flora of Australia* (Eichler *et al.,* in prep.).

Taxonomy

Ranunculus amplus N.G. Walsh & B.G. Briggs, *sp. nov.*

A *Ranunculo inundato* R. Br. ex DC. combinatione characterum sequentium distinguitur: folia majora, petiolo 5–45 cm longo, diametro laminae 5–13 cm; petala multiora (8–16); achenia majora, 2–4 mm longa (rostro excluso).

Type: Victoria, Surry River at Gorae, *A.C. Beauglehole 6610* (holotype: MEL; isotypes: AD, CANB, MEL (2 sheets), NSW).

Stoloniferous *perennial.* Basal *leaves* with lamina palmatisect, 5–13 cm diam., glabrous; ultimate segments 0.5–2 mm wide; petioles 5–45 cm long, glabrous. Flowering stems 10–30 cm high, 1–3-flowered, glabrous or pilose just below flowers. *Sepals* 5, spreading, 3–6.5 mm long, glabrous or shortly ciliate near basal margin. *Petals* 8–16, narrowly obovate to obovate, 5–13 mm long, yellow, obtuse or emarginate; nectary near petal base, c. 1 mm long, lobe rounded to truncate, free for up to ¼ its length. *Stamens* 20–45. *Pistils* 25–45. Receptacle shortly hirsute in stamen-zone, hairs scattered between achenes. *Achenes* ± lenticular, 2–4 mm long, lateral faces smooth or somewhat warty, sometimes indistinctly rippled, the broad margins thickened; beak ± straight, erect or antrorse, c. ¼–⅓ as long as achene-body. (Fig. 1)

Etymology: The epithet is from the Latin *amplus*, large, abundant, referring to the large leaves.

Flowering period: October–November.

Specimens examined: **VICTORIA**: Wannon River, Grampians, E of Mirranatwa Gap, *A.C. Beauglehole 16352*, 9.xii.1967 (MEL, NSW); Wannon River, Grampians, S of Mirranatwa Gap, *A.C. Beauglehole 30601,* 23.ii.1969 (MEL, NSW); Wannon River, 17 km NNE of Dunkeld, *N.G. Walsh 5559*, 24.vii.2002 (MEL); bed of River Wannon under Mount Sturgeon, *Robertson, s.n., s.d.* (K); Wannon, *Wilhelmi, s.n.*, 1857 (K); c. 23 km SW of Casterton, *A.H. Corrick 612*, 19.xi.1980 (MEL); Yarra Glen, 2 miles [3.2 km] south of the town, *H.I. Aston, s.n.*, 2 Dec 1959 (MEL); Yarra River, 2 miles west of Yering Station, *J.H. Willis, s.n.*, 11 Oct 1949 (MEL, NSW); Lilydale, *A.H.S. Lucas, s.n.*, xi.1885 (NSW); Kananook Ck, Seaford, *D. Cook, s.n.* 6.ix.2002 (MEL).

Distribution and Conservation Status: Ranunculus amplus is apparently endemic in

Figure 1. *Ranunculus amplus*. **a.** habit (*Willis,* NSW 44986); **b.** leaf; **c.** flower (Isotype, NSW); **d.** head of achenes**; e.** achene (*Beauglehole 30601,* NSW). Scale bar: a, b = 6 cm; c = 1.5 cm; d = 1 cm; e = 0.6 cm.

Victoria and largely confined to the south-west, from the southern Grampians to near Portland with isolated records from near Yarra Glen (c. 40 km NE of Melbourne), Frankston (c. 35 km S of Melbourne) and Yarram (c. 170 km SE of Melbourne). Occurrences at Yarra Glen have not been relocated despite searches in suitable habtitat in the area by one of us (NGW) and several local botanists (D. Frood, A. Hill, G. Lorimer, D. van Bockel, pers. comm.). It may be extinct at this disjunct locality where wetlands have undergone substantial modification through drainage of the floodplain, dam construction and incursion of weedy aquatic species since the last known occurrence in 1959. It is conserved in the Grampians (Gariwerd) National Park (but there has been no estimate of numbers in the park), and at Bryans Swamp Wildlife Reserve near Dunkeld (south of the Grampians) where there is a large population over several hectares (D. Cook, pers. comm.). Its conservation status is assessed as 3RC-, that is, rare, conserved to some extent, but degree of reservation unknown (Briggs & Leigh 1996).

Habitat: Verges of streams and swamps, tolerating periods of partial submergence, but leaves and flowering stems emergent. At sites in the southern Grampians, *R. amplus* is associated with a dense band of sedges (e.g. *Baumea articulata*, *Cyperus lucidus*, *Carex gaudichaudiana*) and rushes (*Juncus procerus*, *Baloskion tetraphyllum*) fringing a shallow swamp.

Notes: Ranunculus amplus shows considerable variation in leaf size (compare Fig. 1a and 1b), but mostly has leaves larger than any other native stoloniferous *Ranunculus* species with the exception of robust plants of *R. undosus* Melville (which has leaves with significantly broader ultimate divisions). Differences from *R. inundatus*, in addition to the large size of leaves and achenes, include the larger and usually more numerous petals, receptacle shortly pilose among the achenes, and the usually straight achene beak. *Ranunculus inundatus* has leaf laminae 1–3.5(–5) cm diam., on petioles 1–15 cm long; petals 4.5–7 mm long, 5–7 in number; receptacle almost glabrous among the achenes, achenes 1.5–1.8 mm long (excluding the beak) and the achene beak is usually antrorsely curved. The smooth or indistinctly rippled achene faces are among the features distinguishing *R. amplus* from *R. undosus* Melville and *R. meristus* B.G. Briggs & R.O. Makinson, which have ridged lateral achene faces.

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Notes on *Boronia* (Rutaceae) in eastern and northern Australia

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Abstract

Boronia Sm. sections *Boronia* and *Cyanothamnus* (Lindl.) F.Muell. are revised for South Australia, Queensland, New South Wales, Victoria and Tasmania with the exception of *B. anemonifolia* A.Cunn., *B. coerulescens* F.Muell., *B. inornata* Turcz. and *B. rigens* Cheel. Twenty-one taxa are described as new, these being *B. barkeriana* F.Muell. subsp. *angustifolia* Duretto, *B. barkeriana* subsp. *gymnopetala* Duretto, *B. citriodora* Gunn ex Hook.f. subsp. *orientalis* Duretto, *B. citriodora* subsp. *paulwilsonii* Duretto, *B. deanei* Maiden & Betche subsp. *acutifolia* Duretto, *B. elisabethiae* Duretto, *B. hemichiton* Duretto, *B. hippopala* Duretto, *B. imlayensis* Duretto, *B. inflexa* Duretto, *B. inflexa* subsp. *grandiflora* Duretto, *B. inflexa* subsp. *montiazura* Duretto, *B. inflexa* subsp. *torringtonensis* Duretto, *B. montimulliganensis* Duretto, *B. occidentalis* Duretto, *B. pilosa* Labill. subsp. *parvidaemonis* Duretto, *B. pilosa* subsp. *tasmanensis* Duretto, *B. pilosa* subsp. *torquata* Duretto, *B. rozefeldsii* Duretto, *B. warangensis* Duretto, and *B. yarromerensis* Duretto. *Boronia gunnii* Hook.f. is reinstated and taxa are lectotypified where necessary. Within *B.* section *Valvatae* (Benth.) Engl., *B. beeronensis* Duretto, *B. grimshawii* Duretto, and *B. gravicocca* Duretto are newly described and types are identified for *B. keysii* Domin, *B. ledifolia* var. *repanda* F.Muell. ex Domin, *B. rosmarinifolia* A.Cunn. ex Endl. and *B. rubiginosa* Endl. Keys are provided for all taxa. The two fossil taxa, *B. harrisii* Ett. and *B. hookeri* Ett., are also discussed.

Introduction

Boronia Sm. was subjected to a cladistic analysis by Weston *et al.* (1984) who demonstrated that *B.* sections *Boronia*, *Cyanothamnus* (Lindl.) F.Muell. and *Valvatae* (Benth.) Engl. are monophyletic, the former only by the inclusion of a number of other sections and series (see taxonomy). Subsequently a new classification for *B.* section *Boronia* was proposed by Wilson (1998) which included two series, viz. *B.* series *Boronia* and series *Pedunculatae* Benth.

Wilson (1998) revised those species of *B.* sections *Boronia* and *Cyanothamnus* that are found in Western Australia including *B. coerulescens* F.Muell. (section *Cyanothamnus*) and *B. inornata* Turcz. (series *Boronia*), both of which extend to the eastern states. He also discussed *B.* section *Imbricatae* Engl., the sole member of which, *B. cymosa* Engl., is restricted to south-western Western Australia. Two other eastern Australian species of *B.* section *Cyanothamnus*, *B. anemonifolia* A.Cunn. and *B. rigens* Cheel, were revised by Neish and Duretto (2000). Here, the remaining eastern representatives of *B.* sections *Boronia* and *Cyanothamnus* are revised.

Boronia sections *Valvatae*, *Algidae* Duretto and *Alatae* Duretto were subjected to a cladistic analysis by Duretto and Ladiges (1999) and revised by Duretto (1999b). Since these publications, new material has come to light including previously unseen type material as well as specimens of three undescribed species. This material is discussed below.

Materials and Methods

Material: Herbarium specimens were made available from AD, BRI, CANB, DNA, HO, LD, MEL, NE, NSW, PERTH, PR, QRS, and TCD. Cibachromes of specimens at K, colour transparencies of specimens at BM and CGE, and photographs of specimens at

LINN, LIV and W have been seen. Herbarium abbreviations follow Holmgren *et al.* (1990). These specimens were augmented with material collected in the field from 1992 to 2002. Where possible, at least five plants per local site were sampled.

Leaf Anatomy: The central portion of the leaves or leaflets were sectioned transversely. Fresh material was fixed in 70% ethanol when collected. Most material was dehydrated through a graded ethanol series up to 100% ethanol, infiltrated with 100% LR-White (London Resin) through a resin/ethanol series, and polymerised at 60°C. Sections 2 µm in thickness were cut on a Reichert Ultracut ultra-microtome and stained with 0.05% toluidine blue solution (pH 4.4). Some material was sectioned by hand. Voucher specimens for leaf anatomy are listed in Appendix 1.

Scanning Electron Microscopy: Seed surfaces of a representative sample of taxa were surveyed using scanning electron microscopy. Material was mounted on stubs using double sided or carbon tape with conductive carbon paint, coated with gold using an Edwards Sputter Coater S150B and examined and photographed at 5KV using a JEOL 840 Scanning Electron Microscope equipped with a lanthanum hexaboride filament.

Cladistic analysis of Boronia *section* Valvatae: To determine the phylogenetic positions of three new species of the section described herein, these species were scored for the data set of *B.* section *Valvatae sensu lato* that was analysed by Duretto and Ladiges (1999). All taxa and characters of that analysis were used following the methods as outlined for their third analysis. Additional characters (56 young branches, 0-not glandular tuberculate, 1-glandular tuberculate; 57 leaves, 0-not obviously glandular, 1-obviously glandular) were added. The data set was analysed using PAUP 4.03ba (Swofford 2000) and *B.* section *Alatae*, *B.* section *Algidae* and *B.* subsection *Ternatae* Duretto were used as outgroups.

Taxon Descriptions and Distributional Information: Descriptive terminology follows Hewson (1988) for hairs, and Briggs and Johnson (1979) and Weston (1990) for inflorescence structure. Conservation or ROTAP codes follow the format of Briggs and Leigh (1996) for all taxa. Acronyms for botanical divisions of New South Wales follow Harden (1990).

Taxonomy

Boronia Sm., *Tracts nat. hist.*, 288 (1798). *Lectotype species*: *B. pinnata* Sm. *fide* Wilson, *Nuytsia* 12: 121 (1998).

Shrubs or rarely small trees or herbs, usually erect and many branched, variously indumented with simple and/or stellate hairs. *Branches* terete to quadrangular, unarmed. *Leaves* opposite decussate or rarely subopposite or whorled, simple or imparipinnate or bipinnate or tripinnate, 1–21(–53)-foliolate; lateral leaflets opposite or rarely subopposite. *Inflorescence* terminal and/or axillary, cymose or paniculate or flower solitary. *Flowers* bisexual, four-merous, rarely five-merous. *Sepals* free. *Petals* free, usually pink or white, sometimes blue or green or yellow or brown. *Stamens* usually 8, rarely 4, 4–8 fertile, filaments erect, anthers versatile. Carpels +/- free, lacking sterile apex; styles usually fused, arising terminally or subterminally from ovary; ovules two per carpel, usually only one reaching maturity. Fruit of 1–4 cocci; cocci not transversely ridged, with rounded apices. *Seed* released explosively with elastic endocarp, shiny or dull, black or grey or rarely brown. **World** c. 149 spp., endemic to Australia, present in all states and mainland territories.

The genus was named to honour Francesco (Francis) Borone (1769–1794), a young Italian naturalist who had impressed Smith with his enthusiasm and ability (Smith 1798).

The cytoevolution of *Boronia* has been reviewed by Smith-White (1954) and Stace *et al.* (1993), the foliar sclereids by Rao and Bhattacharya (1978, 1981), phytochemistry by Ghisalberti (1997), and horticultural forms by Elliot and Jones (1982), Plummer and Payne (1997) and Spencer (2002, for south-eastern Australia). *Boronia* series *Boronia*, *B.*

series *Pedunculatae* and *B.* section *Cyanothamnus* each have distinctive seed morphology which is discussed and illustrated by Wilson (1998).

> "All the species of *Boronia* are more or less interesting, and attract attention from the neatness of growth, and their pretty pink blossoms. Their dwarf habit and compactness peculiarly fit them for glasshouse culture, and for growing in pots; as they can be placed on any kind of stage, and will, if judiciously treated, bear to be exposed to view on all sides." Paxton (1841, p. 123).

Fossils of *Boronia*

Two species of fossil *Boronia*, *B. harrisii* Ett. and *B. hookeri* Ett. (types lodged at the Australian Museum and Geological Survey of NSW), were described and illustrated by Ettingshausen (1888). The material originated from sub-basaltic deposits of the late Eocene (c. 30 MY ago) in the Emmaville area of northern New South Wales (Pickett *et al.* 1990). Both species are based on leaf fragments, and neither specimen, in particular *B. hookeri*, can be placed confidently in *Boronia* (pers. obs.). Problems with Ettingshausen's identifications have been discussed by Hill (1988a, b).

Boronia hookeri is a pinnate leaved taxon with leaves similar to that of *B. angustifolia* Duretto, *B. amabilis* S.T.Blake and *B. rubiginosa* Endl. (all *B.* section *Valvatae*) which are found in northern New South Wales or nearby in south-east Queensland (see Duretto 1999b). The leaves could just as easily belong to a number of small, pinnate leaved taxa of other families.

Boronia harrisii appears to be made up of a short twig with simple leaves. The leaves are obovate with serrate margins. Ettingshausen (1888) considered *B. harrisii* was intermediate between *B. serrulata* Sm. (see discussion below) and *B. crenulata* Sm. (a Western Australian taxon). Superficially the leaves are similar to those of *B. serrulata* or the juvenile leaves of *B. microphylla* Sieber ex Rchb. (see below). *Boronia serrulata* is restricted to the Sydney sandstones and *B. microphylla* is found from the Granite Belt of Queensland and New South Wales (including the Emmaville area) to the Sydney area. If *B. harrisii* is related to either of these species then it is of interest to note that this leaf shape was present c. 30 MY ago, the age of the deposits.

Unfortunately the poor quality of the specimens, the limited number of organs present, and their questionable placement in *Boronia*, make these specimens almost useless in any character polarisation, or even for determining minimum ages for specific features except the presence of pinnate and simple leaves and serrate leaf margins.

Key to the sections and series of *Boronia* found in Eastern Australia (NT*, SA, Qld, NSW, ACT, Vic., Tas.)

1. Stellate hairs present, if only on flowers; inflorescence axillary ....**section *Valvatae* ***
1: Stellate hairs absent; inflorescence terminal or axillary
    2. Petal tip with a small but distinct incurved hook; seeds usually rugulose, tuberculate; leaves simple, pinnate or bipinnate .....**section *Cyanothamnus***
    2: Petal tip not incurved, abaxial surface with or without a terminal or subterminal apiculum abaxially; seeds smooth (even at high magnification) or dull and finely textured, not tuberculate; leaves simple or pinnate
        3. Petals valvate in bud, not apiculate; stamens glabrous; leaves pinnate, margins flat; inflorescence terminal; seeds dull, finely textured at magnification ....**section *Algidae* ***
        3: Petals imbricate in bud, abaxial surface with or without a terminal or subterminal apiculum abaxially; stamens variously pilose, rarely glabrous (and then leaves simple or leaflets filiform or terete); leaves simple or pinnate, leaflets terete to flat; inflorescence terminal or axillary; seeds shiny, smooth (even at high magnification) .....**section *Boronia***

4. Sepals imbricate in bud, glabrous to pilose abaxially, colour various; dorsal margin of seed with labiose raised testa margins that obscure both fleshy raphe and hilium; leaves simple or pinnate ..... **series *Boronia***
4: Sepals valvate in bud, glabrous abaxially, usually deep purple; seed with smooth dorsal margin, basal raphe obvious and pulpy, cream to brown; leaves simple ..... **series *Pedunculatae***

* see Duretto (1999b) for keys and descriptions to species and infrasectional taxa of *B.* sections *Valvatae* and *Algidae*. Additional information on *B.* section *Valvatae* is also provided below. All species of *Boronia* found in the Northern Territory are placed in *B.* section *Valvatae*.

Key to Eastern Australian (SA, Qld, NSW, Vic., Tas.) species of *Boronia* section *Cyanothamnus*

1. Leaves simple, tips sometimes tridentate 2
1: Leaves compound 5
2. Leaves terete to semi terete, sometimes appressed to stems; erect shrubs 3
2: Leaves elliptic, flat, not appressed to stems; usually decumbent shrubs and herbs... 4
3. Leaf tip acute ..... ***B. anemonifolia* #**
3: Leaf tip obtuse ..... ***B. coerulescens* #**
4. Leaves concolorous; branchlets pilose between leaf decurrencies (SA; NSW; Vic.; Tas.) ..... **8. *B. nana***
4: Leaves discolorous, abaxial surface paler; stems glabrous (Qld; NSW) ..... **9. *B. polygalifolia***
5. Leaflet tips usually trilobed or if not trilobed (Tas.) then stems with obvious glands and distinct leaf decurrencies (Qld; NSW; Vic.; Tas.) ..... ***B. anemonifolia* #**
5: Leaflet tips never trilobed; stems without the above combination of characters (Qld; NSW) 6
6. Stems glabrous, glabrescent or sparsely and minutely pilose between distinct leaf decurrencies, not obviously glandular to slightly glandular tuberculate (and then stems glabrous) 7
6: Stems hispidulous to pilose, rarely glabrous, not obviously glandular to glandular tuberculate, leaf decurrencies absent or if present stems hispidulous to pilose 9
7. Leaves bipinnate and tripinnate; branches glabrous, distinctly quadrangular (S Qld; NSW) ..... **1. *B. anethifolia***
7: Leaves pinnate and bipinnate; branches glabrescent or sparsely and minutely pilose, or rarely glabrous, not quadrangular (N Qld) 8
8. Inflorescence 1–3-flowered; peduncles 1–1.5 mm long; anther apiculum glabrous (Qld - Mt Mulligan) ..... **2. *B. montimulliganensis***
8: Inflorescence 7–20^{+}-flowered; peduncles 2–2.5 mm long; anther apiculum pilose (Qld - Warang & Just Range) ..... **3. *B. warangensis***
9. Weak decumbent subshrub; leaves 3(–5)-foliolate, abaxial surface of leaves without red/brown midrib (SA; Vic.; Tas.) ..... **8. *B. nana***
9: Woody shrub, usually erect; leaves 3–11-foliolate, abaxial surface of leaves with or without red/brown midrib (Qld; NSW) 10
10. Adaxial surface of sepals puberulous; leaves 4–12 mm long and wide (NSW - CT, ST, CC) ..... ***B. rigens* #**
10: Adaxial surface of sepals glabrous; leaves 8–50 mm long, 7–60 mm wide (Qld; NSW - NT, NWS, CWS) 11
11. Petals 5–7 mm long ..... **7. *B. inflexa***
11: Petals 2–4 mm long 12
12. Terminal leaflets 5–30 mm long (N Qld) ..... **4. *B. yarromerensis***
12: Terminal leaflets 0.5–7 mm long (Qld; NSW) 13

13. Branchlets slightly to distinctly glandular tuberculate; inflorescence with (1–)7–20+ flowers, peduncles 2–8 mm long; secondary inflorescence units (1–)2–4 mm long; leaflets glabrous or with few hairs at base; leaves bipinnate.....**5. *B. bipinnata***
13: Branchlets not to slightly glandular tuberculate; inflorescence with 1–3(–7) flowers, peduncles 0.5–2(–9, and then leaves pinnate, Granite Belt) mm long; secondary inflorescence units 0–1.5 mm long; leaflets glabrous to hispidulous; leaves pinnate or bipinnate 14
14. Leaves 3–7-foliolate, usually some leaves bipinnate; sepals < 2 times as long as wide; stem hairs to 0.25 mm long; usually growing on sandstone or sandy soils (Qld - less Granite Belt of SE; NSW - NWS, CWS, NC?) .....**6. *B. occidentalis***
14: Leaves 3–5-foliolate, pinnate (rarely bipinnate and then branch hairs c. 0.5 mm long; N.S.W. - Gibraltar Ra.); sepals > 2 times as long as wide; stem hairs to 0.5 mm long; growing on granite (SE Qld - Granite Belt; NE NSW - Torrington area, Gibraltar Ra.) . .....**7. *B. inflexa***

Boronia coerulescens was revised by Wilson (1998), and *B. anemonifolia* and *B. rigens* were revised by Neish and Duretto (2000). These taxa will not be dealt with further here.

Key to Eastern Australian (SA, Qld, NSW, Vic., Tas.) species of *Boronia* section *Boronia*.

1. Leaves simple 2
1: Leaves pinnate 8
2. Leaves linear, terete or flat 3
2: Leaves elliptic or obovate or rhombic or circular, flat 5
3. Inflorescence terminal, often on short axillary shoots; staminal filaments glabrous; stems slightly glandular tuberculate (NSW - CC, CT, ST) .....**32. *B. deanei***
3: Inflorescence terminal and axillary; staminal filaments pilose or rarely glabrous; stems smooth (SA; Vic.; NSW - NC; Qld).....4
4. Sepals 3.5–4 mm long; peduncles 2–9 mm long; leaves channeled above (Qld; NSW) .....**30. *B. falcifolia***
4: Sepals 1–3 mm long; peduncles 8–17 mm long; leaves not or slightly channeled above (SA; Vic.).....**31. *B. filifolia***
5. Leaves elliptic, at least as twice as long as wide; sepals valvate in bud.....6
5: Leaves obovate or circular, less than twice as long as wide; sepals imbricate in bud. 7
6. Petals 3–6 mm long; sepals persistent; bracteoles caducous (SA; Qld; NSW; Vic.; Tas.) .....**10. *B. parviflora***
6: Petals 6–11 mm long; sepals caducous; bracteoles persistent (NSW)..... .....**11. *B. barkeriana***
7. Leaf margins finely toothed; staminal filaments pilose (NSW - CC) **20. *B. serrulata***
7: Leaf margin entire; staminal filaments glabrous (NSW - ST; Tas.)..... .....**35. *B. rhomboidea***
8. Branchlets glandular tuberculate, sometimes slightly so and then leaves also slightly glandular tuberculate 9
8: Branchlets and leaves not glandular tuberculate 18
9. Stamens glabrous; leaves 3(–5)-foliolate; leaflets terete, club-like (WA; SA) ....***B. inornata* #**
9: Stamens variously pilose; leaves 3–11-foliolate; leaflets flat, elliptic to obovate (NSW; Vic.; Tas.).....10
10. Sepals glabrous or ciliate.....11
10: Sepals sparsely to densely hispidulous abaxially 16
11. Leaves 45–70 mm long.....**14. *B. muelleri***
11: Leaves 8–32 mm long.....12

12. Glands on branches with a distinct crown or ring of hairs or tuberculae; terminal leaflets 1–3(–7) mm long, 0.5–2.5 mm wide (Qld; NSW).....**33. *B. microphylla***
12: Glands on branches glabrous; terminal leaflets 1.5–16 mm long, (0.5–)1.5–4 mm wide (SE NSW; Vic.; Tas.) 13
13. Branchlets glabrous (Vic.) .....**34. *B. galbraithiae***
13: Branchlets hispidulous (NSW; Tas.).....14
14. Largest lateral leaflets 17–25 mm long; leaflets narrowly oblanceolate, glands on leaves and branchlets usually appearing as shiny discs.....**29. *B. gunnii***
14: Lateral leaflets to 16 mm long; leaflets elliptic to oblong to narrowly elliptic to narrowly oblanceolate; glands on leaves not appearing as shiny discs.....15
15. Leaves 7–13-foliolate; petiole 4–8 mm long; anthopodia 5–10 mm long; sepals 1–1.5 mm long, glabrous or minutely ciliate and then with few hairs (NSW).....
.....**15. *B. imlayensis***
15: Leaves 1–9-foliolate; petiole 1.5–6 mm long; anthopodia 1.5–15 mm long; sepals 0.75–2.5 mm long, minutely ciliate (Tas.) .....**21. *B. citriodora***
16. Leaves hispidulous all over; cocci hispidulous (Tas. - Horseshoe Marsh area).....
.....**23. *B. hippopala***
16: Leaves hispidulous only on petiole, rachis segments and proximal half of leaflets; cocci glabrous (seen only for *B. hemichiton*) (Tas. - Ben Lomond, Mt Barrow, Mt Arthur) 17
17. Leaflets 1–2 mm wide; sepals 1.75–2 mm long, 1–1.25 mm wide (Tas. - Ben Lomond, Mt Barrow).....**21. *B. citriodora***
17: Leaflets 0.5–1 mm wide; sepals 0.75–1.25 mm long, 0.25–0.5 mm wide (Tas. - Mt Arthur).....**24. *B. hemichiton***
18. Branchlets glabrous 19
18: Branchlets variously hairy 25
19. Style vestigial, obscured by the massively swollen globose stigma (NSW - CC, CT)
.....**19. *B. floribunda***
19: Style distinct, stigma minute scarcely wider than obvious style (SA; Vic.; NSW; Qld)
.....20
20. Petiole to 8 mm long; leaflets 1–1.5 mm wide, terete or flat.....21
20: Petiole 5–17 mm long; leaflets 1–9 mm wide, flat 22
21. Petiole 2–8 mm long (Qld; NSW) .....**30. *B. falcifolia***
21: Petiole to 0.5 mm long (SA; Vic.) .....**31. *B. filifolia***
22. Leaf margins slightly glandular crenulate; leaf decurrencies prominent .....
.....**13. *B. thujona***
22: Leaf margins entire; leaf decurrencies absent or faint 23
23. Sepals 0.6–0.8(–1) mm long; inflorescence longer than leaves, 1–9-flowered; leaf decurrencies absent (Qld) .....**18. *B. rivularis***
23: Sepals 1–1.5 mm long; inflorescence shorter or slightly longer than leaves, 3–40-flowered; leaf decurrencies faint or absent (NSW; Vic.).....24
24. Leaflets narrow-elliptic or narrow-oblong, 1–3(–7) mm wide; staminal filaments densely pilose; style glabrous; inflorescence 3–40-flowered (NSW)...**12. *B. pinnata***
24: Leaflets elliptic to slightly lanceolate or obovate, 2–8 mm wide, widest leaflet 4–8 mm wide; staminal filaments sparsely pilose; style glabrous or pilose; inflorescence 3–25-flowered (Vic.).....**16. *B. latipinna***
25. Stems pilose 26
25: Stems hispidulous 28
26. Sepals deltate, 1–1.5 mm long and wide, glabrous abaxially; anthopodia glabrous; leaves (3–)7–19-foliolate, 12–47 mm long (Qld; NSW - NC) .....**17. *B. safrolifera***
26: Sepals narrowly deltate, 1–4.5 mm long, 0.75–2 mm wide glabrescent to pilose abaxially; anthopodia variously pilose; leaves 3–7(–13)-foliolate, 3–22 mm long (SE NSW; Vic.; Tas.) 27

27. Widest leaflets 1–4 mm wide, flat; sepals glabrescent to pilose abaxially (Vic.; Tas.) .....**27. *B. pilosa***
27: Leaflets 0.5–1 mm wide, subterete; sepals pilose abaxially (NSW)**26. *B. subulifolia***
28. Sepals hispidulous abaxially.....29
28: Sepals glabrous abaxially or ciliate.....31
29. Weakly ascending to prostrate subshrub; leaves 5–11(–15) mm long, 5–18 mm wide, leaflets to 1 mm wide (W Tas.).....**25. *B. elisabethiae***
29: Erect shrub; leaves 6–22 mm long and wide; leaflets 1–3 mm wide (Vic.; NE Tas.) 30
30. Leaves hispidulous all over, 5–11-foliolate, 6–22 mm long, longest leaves 14–22 mm long; inflorescence 1–5-flowered; sepals 1–1.5 mm long (Vic.).....**22. *B. citrata***
30: Leaves hispidulous on proximal portion only, 3–7-foliolate, 7–14 mm long; flowers solitary; sepals 1.75–2 mm long (Tas.).....**21. *B. citriodora***
31. Stigma significantly wider and longer than style, often concealing it (SA; Vic.; Tas.) .....**27. *B. pilosa***
31: Stigma shorter and slightly wider than style, not concealing it (Qld; NSW; Tas.)..32
32. Weakly ascending to prostrate subshrub; leaves 5–11(–15) mm long, 5–18 mm wide, 3–9-foliolate; leaflets to 1 mm wide; sepals 1.5–3 mm long (W Tas.)..... .....**25. *B. elisabethiae***
32: Erect shrubs, or if semi erect then leaflets > 1 mm wide; leaves 6–25 mm long and wide, 3–19-foliolate; widest leaflets 1–4 mm wide; sepals 0.75–2.5 mm long (Qld; NSW; Tas.).....33
33. Sepals and anthopodia glabrous (Qld; NSW) .....**17. *B. safrolifera***
33: Sepals glabrescent to ciliate; anthopodia sparsely hispidulous (Tas.).....34
34. Sepals narrowly deltate, tips acute to acuminate; ovary and style glabrous to densely pilose; petals to 6 mm long (very rarely to 7.5 mm long and then leaflets < 2 mm wide); hairs concentrated between distinct (rarely indistinct) leaf decurrencies, elsewhere branches glabrous or glabrescent; widest lateral leaflets to 2 mm wide..... .....**27. *B. pilosa***
34: Sepals deltate (if narrowly deltate then petals 8-10.5 mm long and widest lateral leaflets > 2.5 mm wide), tip acute; ovary glabrous; style glabrous to sparsely pilose; hairs usually spread evenly around branches or more dense between indistinct leaf decurrencies; widest lateral leaflets 1–4 mm wide.....35
35. Leaflets narrowly oblanceolate; largest lateral leaflets 17–25 mm long, 0.75–2.5 mm wide; glands on leaflets and branchlets usually appearing as shiny discs; sepals c. 1 mm long, 0.75–1 mm wide.....**29. *B. gunnii***
35: Leaflets narrowly obovate to narrowly elliptic or rarely narrowly oblanceolate; lateral leaflets 2–16 mm long, 0.5–4 mm wide; glands on leaflets and branchlets not appearing as shiny discs; sepals (0.75–)1–3.5 mm long, 0.75–2.5 mm wide.....36
36. Petals 8–10 mm long; petiole 1–3 mm long; leaves congested; lateral leaflets 2.5–4 mm wide (Tas. – Schouten Is.) .....**28. *B. rozefeldsii***
36: Petals 3–7 mm long, if 7–8.5 mm long then petiole 3–6 mm long and leaves not congested; lateral leaflets 0.5–3.5 mm wide (W, central and NE Tas., not on Schouten Is.) .....**21. *B. citriodora***

Boronia inornata was revised by Wilson (1998) and will not be dealt with further here; see also discussion under *B. pilosa* subsp. *parvidaemonis*.

Boronia section ***Cyanothamnus*** (Lindl.) F.Muell., *Fragm.* 9: 113 (1875).

Cyanothamnus Lindl., *Edwards's Bot. Reg.-Appendix to Vols 1-23: A sketch of the Vegetation of the Swan River Colony*, 18 (1 Dec. 1839); *B.* series *Cyaneae* Benth., *Fl. Austral.* 1: 309, 319 (1863); *B.* section *Cyaneae* (Benth.) de Wild, *Icon. Select.* 2: 67 (1901), *nom. illeg. Lectotype species*: *B. ramosa* (Lindl.) Benth. *fide* Wilson, *Nuytsia* 12:

144 (1998).
Hairs simple or rarely stellate (WA). *Leaves* simple, pinnate, bipinnate or tripinnate; lamina flat, midrib not raised on abaxial surface, usually indented adaxially. *Inflorescence* axillary; prophylls and metaxyphylls persistent. *Sepals* imbricate in bud, persistent with fruit. *Petals* imbricate in bud, often with large pellucid oil glands, persistent or caducous, midrib not raised abaxially, tip with a small but distinct incurved hook. *Stamens* 8, all fertile; anthers equal, glabrous or with hairs. *Disc* entire, entirely within staminal whorl, glabrous. *Seed* black or grey, shiny or dull, elliptic to kidney shaped in outline, adaxial margin flat to convex; testa rugulose, at magnification tuberculate, with or without wax platelets between tubercula; tubercula black, shiny; hilum linear along adaxial margin; raphe minute at base of seed; chalazal opening basal, covered by raphe; placental endocarp membranous, caducous (see Wilson 1998).

Boronia section *Cyanothamnus*, with 23 species, is present in all states and absent from the Northern Territory. Eleven species are confined to the east coast and another 11 to south-west Western Australia. *Boronia coerulescens* is widespread and found in all southern mainland states though only the type subspecies extends to eastern states (Wilson 1998).

1. *Boronia anethifolia* A.Cunn. ex Endl. in Endl. *et al. Enum. pl.* 16 (1837); *B. anemonifolia* c. *anethifolia* (A.Cunn. ex Endl.) Benth., *Fl. Austral.* 1: 322 (1863), p.p.; *B. anemonifolia* var. *anethifolia* Benth. *sensu* F.M. Bailey, *Queensl. fl.* 1: 88 (1889), p.p., *F.M. Bailey, Compr. cat. Queensland pl.* 76 (1913), p.p. *Type citation*: "Hunters River (A. Cunningh. 1825)". *Type*: Hunters River, N.S.Wales, *AC* [*Alan Cunningham*], 1825 (lectotype, here designated, W *n.v.* [photothek nr. *2016*, copy at MEL *2068452*]); Rocky Hills, Hunters R., N.S.Wales [*Alan Cunningham*], 1825 (probable isolectotype W *n.v.* [photothek *2015*, copy at MEL *2068464*]); Hunters River, *A.Cunningham 69*, 1825 (probable isolectotype K *n.v.* [cibachrome MEL *2041266*, photograph AD *99548105*]).

[*Boronia anethifolia* A.Cunn. ex Hook., *Companion Bot. Mag.* 1: 277 (1836), *nom illeg.,* provisional name only, see *Notes* below]

[*Boronia anethifolia* A.Cunn. ex Lindl., *Edwards's Bot. Reg.* 27, sub. t. 47 (1841), *nom. Illeg., non* A.Cunn. ex Endl. *Type citation*: "Interior of New Holland, lat. 28.5°S. 1827." *Type*: Interior, 28 ? degrees lat, N.S.Wales, [Alan Cunningham], 1827 (syntype W *n.v.* [photothek nr. 2017, copies at MEL *2068463*, NSW])]

Illustrations: B.A. Lebler, *Queensland Agric. J.* 98: 200 (1972); B.A. Lebler, *Wildflowers of South East Queensland* 1: 29 (1977); N.W. Beadle and L.D. Beadle, *Students Fl. North East New South Wales* 4: 554, Fig. 243d (1980), leaf; A. Fairley and P. Moore, *Native Plants of the Sydney District*, 236, pl. 818 (1989), photograph; L. Robinson, *Field Guide to the Native Plants of Sydney*, 115 (1991); P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 231 (1991); P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 269 (2002).
Erect, woody *shrub* to 1 m high; glabrous or glabrescent apart from inflorescence and flowers. *Branchlets* slightly glandular tuberculate, with prominent leaf decurrencies. *Leaves* usually bipinnate, sometimes imparipinnate or tripinnate, 5–11-foliolate with lower 1–3 leaflet pairs 3–5-foliolate, entire leaf in outline (11–)21–40 mm long, (5–)15–40 mm wide, slightly glandular tuberculate; petiole 6–16 mm long; rachis segments 3–15 mm long; terminal leaflets (1.5–)3–14 mm long, 0.5–2 mm wide, linear to linear-elliptic, rarely elliptic (Gibraltar Range, NSW), concolorous, dorsiventral, dense region of large undifferentiated cells between the spongy and palisade mesophyll layers, flat, margins entire, tip acute to minutely mucronate; lateral leaflets similar to terminal leaflets but usually longer, 3–15 mm long, (0.5–)1–2 mm wide. *Inflorescence* 3–14(–20^{+})-flowered, not obviously glandular, shorter than leaves; peduncles 2–6 mm long, secondary inflorescence units 0.5–3 mm long, glabrous or hispidulous between

decurrent bract bases; prophylls and metaxyphylls 1–2.5 mm long, glabrous or minutely ciliate; anthopodia 2–4 mm long, glabrous or hispidulous between decurrent sepal bases. *Sepals* deltate to broadly ovate, 1–1.25 mm long and wide, not obviously glandular, glabrous or minutely ciliate, tip thickened, obtuse. *Petals* usually white, occasionally light pink, becoming orange on drying, 3–4 mm long, obviously glandular, glabrous, persistent. *Staminal filaments* pilose along margins, slightly glandular tuberculate towards apex; anthers glabrous, apiculum glabrous, erect. *Ovary* glabrous; style pilose; stigma minute, entire, as wide or slightly wider than style. *Cocci* 2.5–4 mm long, 2–2.5 mm wide, glabrous. *Seed* black, shiny, 2–3 mm long, 1.5–2 mm wide, rugulose with large longitudinal, parallel ridges, no wax crystals between tubercula. **Narrow-leaved Boronia.**

Representative specimens (c. 140 specimens examined): **QUEENSLAND**; MORETON: Northern Slopes of Mt Maroon, 28°12'S 152°43'E, *P.I. Forster 6833, L.H. Bird and A.R. Bean*, 26.v.1990 (BRI, CANB, MEL, PERTH); DARLING DOWNS: 1.6 km E of Fletcher on granite hilltop, *J. Armstrong 680*, 27.xi.1973 (NSW); 3.3 km SE of Glen Alpin, 28°4-'S 151°5-'E, *C.Gittins 2784,* 20.ix.1974 (BRI); Messines via Cottonvale, *M. Greener s.n.*, ix.1930 (BRI *AQ150942*); Girraween NP, 28°50'S 151°56'E, *S.T. Blake 23656*, 2.xi.1971 (BRI); **NEW SOUTH WALES**; NORTH COAST: Mt Chaelundi, eastern side just below crest, 30°03'S 152°22'E, *J.T. Hunter and V.H. Hunter 160*, 27.vi.1993 (NE); Surveyors Ck trail turnoff, Gibraltar Range NP, 29°32'S 152°16'E, *M.F. Duretto 680-684*, *P.G. Neish and I. Thompson*, 26.x.1995 (MEL); Dandahra Crags, Gibraltar Range NP, 29°33'S 152°18'E, *M.F. Duretto 676-678, P.G. Neish and I. Thompson*, 25.x.1995 (*MFD676* - BRI, MEL, NSW; *MFD 677-678* - MEL); Gibraltar Range NP, c. 67 km E of Glen Innes, on the Gwydir Hwy, *R. Coveny 2213*, 2.x.1969 (BRI, NSW); Gibraltar Range NP, just below and SE of Anvil Rock, *I. Southwell H85*-012, 16.iv.1985 (CANB); *E.F. Constable s.n.*, 5.v.1961 (AD, CANB, NE, NSW *56125*); The Lookout, Gibraltar Range, 29°36'S 152°18'E, *E.F. Constable s.n.*, 5.v.1961 (CANB, NSW *56125*); NORTHERN TABLELANDS: Bolivia Range, c. 14 km N of Deepwater, 29°20'S 151°54'E, *J.B. Williams s.n.*, 4.ix.1979 (NE *51823*); NORTH WESTERN SLOPES: Flagstone Ck, NW of Emmaville, 29°17'S 151°34'E, *J.B. Williams s.n.*, 10.xi.1989 (NE *52458*); Willala Hills, 55 km S of Narrabri, *H. Streimann s.n.*, 12.xii.1973 (BRI, CANB); CENTRAL COAST: Norton's Basin, 13 km SW of Penrith, 33°52'S 150°37'E, *R. Coveny 5494*, 10.vii.1974 (CANB, NSW); Mt Yengo, 10 miles [c. 16 km] S of Howes Valley, *E.F. Constable 7158*, 22.ix.1966 (NSW); CENTRAL TABLELANDS: Coxs Gap, 6.9 km NNE of the Sandy Hollow-Muswellbrook Rd via Wybong, 32°14'S 150°39'E, *R. Coveny 5625 and S. Jacobs*, 17.ix.1974 (CANB, NSW); Jenolan Gorge, on Moorara Boss, 9 km E of Jenolan Caves, 33°49'S 150°06'E, *D. Benson 1784 and D. Keith*, 24.v.1984 (NSW); CENTRAL WESTERN SLOPES: Pine Ridge, 10 miles [c. 16 km] N of Howell, 29°49'S 151°03'E, *H.J. Wisemann s.n.*, x.1971 (NE *29203*); Goulburn River Valley, Lee's Pinch, 34 km SW of Merriwa, 32°19'S 150°02'E, *I.R. Telford 5121*, 28.x.1976 (CANB); Track above Sandy Hollow Caravan Park, 32°20'S 150°34'E, *J.M. Powell 2907*, 23.vii.1987 (CANB, NSW); Goonoo Forest, Dubbo-Mendooran, *R.T. Perry s.n.*, viii.1974 (NSW *385723*); SOUTH COAST: 1.8 km due S of confluence of Burra and Donald Cks, 35°05'S 150°09'E, *M.F. Duretto 704-708, P. Neish and I. Thompson*, 31.x.1995 (MEL); Prominence 1.9 km N from Coondella trig. point, c. 16 km WSW of Moruya, 35°56'S 149°54'E, *N.G. Walsh 1886*, 7.xii.1987 (CANB, MEL, NSW); Deua NP, ridge running off Mt Donovan, 1.8 km NE of summit, c. 20 km WNW of Moruya, 35°51'S 149°54'E, *P. Beesley 378 and D. Binns*, 28.iii.1985 (CANB); SOUTHERN TABLELANDS; Spur N of Wadbilliga Mtn, *I. Olsen 2366*, 13.x.1974 (CANB, NSW *n.v.*).

Notes: W.J. Hooker (1836, p. 277), while discussing novelties of the Tasmanian flora, made reference to a species, from New South Wales, he considered allied to *B. variabilis* Hook. (= *B. anemonifolia* subsp. *variabilis* (Hook.) P.G.Neish): he states 'A species nearly allied to this is the *B. anethifiolia* of Cunningham's MSS., found by that enterprising Naturalist, on the West branches of Hunter's River, and in the Wellington Valley; but the stems are remarkably angular, the leaflets acute, the flowers more numerous on the peduncle.' Hooker did describe taxa that were new to science in this manuscript and when doing so, eg. for *Correa ferruginea* Gunn ex Hook. and *Lasiopetalum discolor* Hook. on the opposite page, he always added ', n. sp.' after the

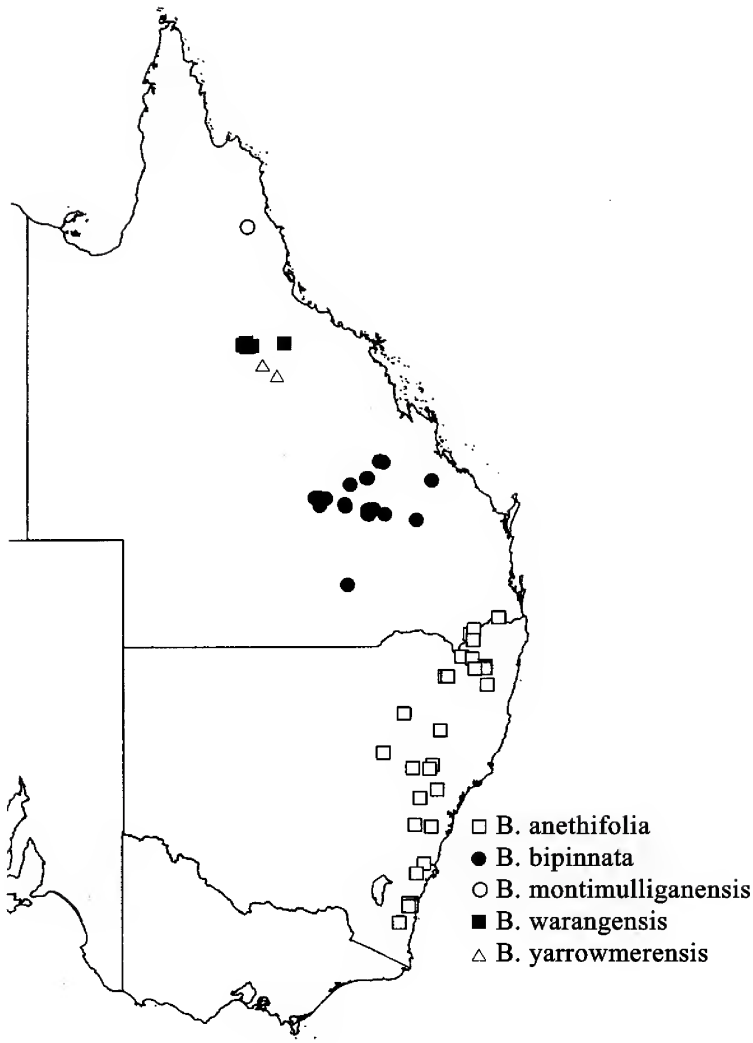

Figure 1. Distribution of *B. anethifolia*, *B. bipinnata*, *B. montimulliganensis*, *B. warangensis*, *B. yarromerensis*.

name and provided a Latin description. If specimens were annotated with a manuscript name by the collector, as with *C. ferruginea*, Hooker acknowledged this by including the taxon's name with the author at the end of the discussion, eg. '*C. ferrugine*, *Gunn MSS*.' It is clear that Hooker was referring to Cunningham's material and manuscript (or manuscript name) when discussing the relationships of *B. variabilis* and *B. anethifolia.* Even though Hooker did state where the material of *B. anethifolia* was collected and gave a couple of distinguishing characters, in English not Latin, it is apparent that he did not intend to describe *B. anethifolia* in his manuscript discussing the Tasmanian taxa. In effect Hooker's *B. anethifolia* is a provisional name only.

Bentham (1863) and Bailey (1899, 1913) included *B. bipinnata* in their concepts of *B. anemonifolia* var. *anethifolia* and Beadle and Beadle (1980) listed it under *B. anethifolia. Boronia anethifolia* differs from other members of *B.* section *Cyanothamnus* found on the east coast by being glabrous or glabrescent (apart from the flowers), having

distinctively raised leaf decurrencies which give the branches a distinctive sharply angular shape, flat leaflets, and broadly deltate sepals.

Populations at Gibraltar Range (e.g. *Conveny 2213, Duretto 676, 680-684*) have relatively wide elliptic leaflets (usually 1.5–2 mm wide) while in the remaining populations the leaflets are linear and usually 1–1.5 mm wide. There are intermediate specimens from Anvil Rock (*Southwell H85-012*) and The Lookout (*Constable s.n.,* NSW *56125*) as well as scattered collections from throughout the range of the species. This variation warrants further detailed investigation.

Distribution and ecology: *Boronia anethifolia* is found from the Border Ranges of Queensland and New South Wales south along the ranges to Wadbilliga Mountain (Southern Tablelands) and the South Coast of New South Wales (Fig. 1). Isolated populations are found on some rocky areas on the Western Slopes of New South Wales, e.g. Willala Hills south of Narrabri and Goonoo Goonoo. The species is found in heath or dry sclerophyll forest on mountain tops, ridges, rocky slopes and other exposed rocky areas. Usually the species is found on granites and sandstones but is also found on other rocks such as trachytes (e.g. Mt Maroon, Qld). The known distribution, ecology and conservation status of this species in the Central Tablelands and Central Coast areas (New South Wales) are discussed by Benson and McDougall (2001). *Boronia anethifolia* was found to be self compatible by Weston *et al.* (1984). Flowering June-October; fruiting September-December.

Conservation status: *Boronia anethifolia* appears to be common, widespread and well protected in reserves. Benson and MacDougall (2001) noted that the species is uncommon in the Central Tablelands and Central Highlands of New South Wales. The broad-leafed form from Gibraltar Range (see *Notes* above) is restricted in distribution and research to determine its taxonomic and conservation status is required.

Etymology: The specific epithet refers to the deeply divided leaves with narrow leaflets which resemble that of *Anethum* Tourn. ex Linn. (Dill, Apiaceae).

2. *Boronia montimulliganensis* Duretto *sp. nov.*

A *Boronia bipinnata* Lindl. caulibus eglandulosis, foliis ad bases clare decurrentibus et foliolis longioribus differt; a *B. warangensis* Duretto inflorescentiis paucifloris et appendicibus antherarum glabris differt.

Type: QUEENSLAND: COOK: Mt Mulligan, a mesozoic sandstone mountain c. 40 km NW of Dimbulah, 16°54'S 144°51'E, *J.R. Clarkson 5917*, 18.iv.1985 (holotype BRI *AQ399193*; isotypes BRI [MBA], CANB *365418*, MEL *250912,* MEL *2068522*, PERTH *n.v.*, QRS *n.v.*). (Figs 2 A-C).

Erect, woody *shrub* to at least 35 cm tall. *Branchlets* smooth with visible glands, sparsely and minutely pilose between distinctive leaf decurrencies, becoming glabrous with age, hairs to 0.25 mm long. *Leaves* imparipinnate or bipinnate, (3–)5–7-foliolate, lowermost pinnae sometimes ternate, entire leaf in outline (15–)20–40 mm long, (15–)30–34 mm wide, glabrous or glabrescent, not obviously glandular, glands black on drying; petiole 7–12 mm long; rachis segments 5–11 mm long; terminal leaflets 5–15 mm long, 1–1.25 mm wide, linear, concolorous, dorsiventral, region of undifferentiated cells between the spongy and palisade mesophyll layers, flat, margins smooth, tip acute, sometimes slightly recurved; lateral leaflets similar to terminal leaflets but longer, 6–17 mm long, 1–1.25 mm wide. *Inflorescence* 1(–3)-flowered, usually only one flower open at a time, not obviously glandular, glabrous, much shorter than leaves; peduncles c. 1 mm long; prophylls 0.5–2.5 mm long; metaxyphylls c. 0.5 mm long; anthopodia 0.5–1 mm long. *Sepals* circular, 1–1.25 mm long and wide, flat, not obviously glandular, glabrous, tip obtuse. *Petals* white, 2–2.5 mm long, not obviously glandular, glabrous, persistent. *Staminal filaments* pilose, glandular tuberculate towards apex; anthers glabrous, apiculum minute. *Ovary* glabrous; style pilose; stigma entire, minute, scarcely wider than

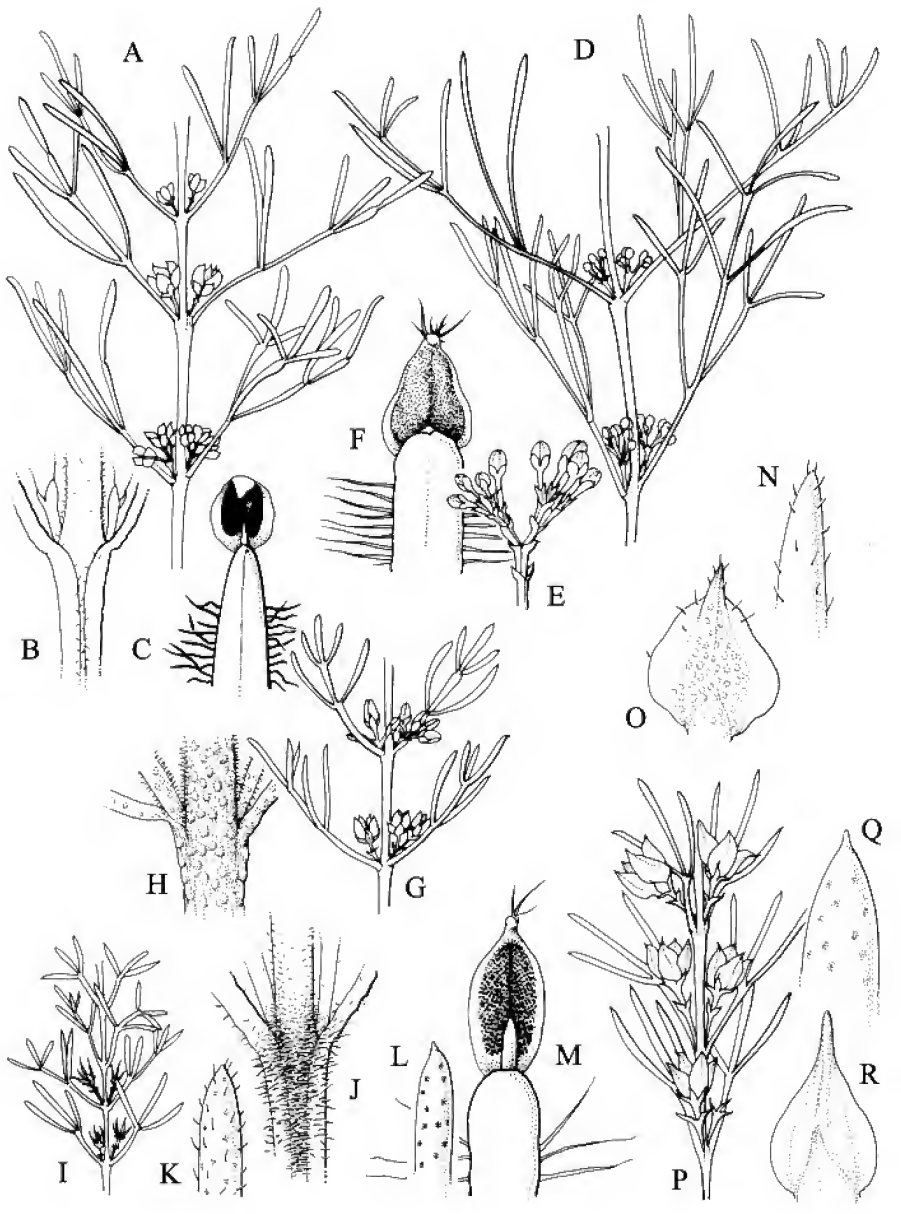

Figure 2. A-C, *B. montimulliganensis*: A, flowering branchlet, × 1; B, stem, × 5; C, distal portion of antisepalous stamen, × 40 (A-C, *Clarkson 5917*, BRI). D-F, *B. warangensis*: D, flowering branchlet, × 1; E, inflorescence, × 2; F, distal portion of antisepalous stamen, × 40 (D-E, *Duretto 371*, MEL *2049260*; F, *Cumming 9671,* BRI *AQ474307*). G-H, *B. yarromerensis*: G, flowering branchlet, × 1; H, stem, × 5 (G-H, *Henderson H2853*, BRI *AQ414467*). I-K, *B. inflexa* subsp. *inflexa*: I, flowering branchlet, × 1; J, stem, × 5; K, leaflet tip, × 10 (I-K, *Armstrong 1149*, NSW *385918*). L-M, *B. inflexa* subsp. *montiazura*: L, leaflet tip, × 10; M, distal portion of antisepalous stamen, × 40 (L-M, *Dodd A3-12-1*, BRI *AQ12434*). N-O, *B. inflexa* subsp. *grandiflora*: N, leaflet tip, × 10; O, abaxial surface of sepal, × 10 (N-O, *Harslett s.n.*, NE *2638*). P-R, *B. inflexa* subsp. *torringtonensis*: P, flowering branchlet, × 1; Q, leaflet tip, x 10; R, abaxial surface of sepal, × 10 (P-R, *Williams s.n.*, MEL *2040351*).

the style. *Cocci* c. 3.5 mm long, c. 1.75 mm wide, glabrous. *Seed* dull, grey, 2.5–3 mm long, c. 1.5 mm wide, irregularly rugulose, wax platelets between tubercula.

Additional specimens examined: Known from the type material only.

Notes: *Boronia montimulliganensis* appears to be most closely related to *B. warangensis*, both sharing the glabrous, glabrescent or sparsely and minutely pilose (between leaf decurrencies) stems with distinct leaf decurrencies. *Boronia montimulliganensis* can be distinguished from *B. warangensis* by having 1–3 flowers per inflorescence (cf. 7–20+) and glabrous anther appendages (cf. pilose); and from *B. bipinnata* by the eglandular branchlets with distinctive leaf decurrencies and longer leaflets (5–15 mm long; cf. 1.5–9 mm long).

Distribution and ecology: The species is known from Mt Mulligan, north Queensland (Fig. 1), where it is found in *Eucalyptus* woodland on sandstone (collector's notes). Flowering and fruiting material has been collected in April.

Conservation status: *Boronia montimulliganensis* is known from the type collection only. Mount Mulligan is on private property and fairly inaccessible and so *B. montimulliganensis* is probably secure: a conservation code of 1K is appropriate. Coal was once mined under the mountain and any future mining, as well as increased tourist activities, could pose a threat to the species. Surveys are required to ascertain accurate distributional, population size and conservation data for this species.

Etymology: The specific epithet refers to Mt Mulligan, an isolated mountain to which this species is apparently restricted.

3. *Boronia warangensis* Duretto, *sp. nov.*

A *Boronia bipinnata* Lindl. caulibus leviter glandulo-tuberculatis, foliis ad bases clare decurrentibus et foliolis longioribus differt; a *B. montimulliganensis* Duretto inflorescentiis multifloris et appendicibus antherarum pilosis differt.

Type: QUEENSLAND: BURKE: edge of the White Mountains at "Warang" Station, c. 20°27'S 144°50'E, *M.F. Duretto 371 and A. Vadala*, 15.v.1993 (holotype MEL *2049260*; isotypes BRI, CANB, MEL *204261*). (Figs 2 D-F).

Boronia sp. (Warang R.J.Cumming 9671): P.I. Forster, '*Rutaceae*' in R.J.F. Henderson, *Queensland Plants: names and distribution*, 185 (1997).

Erect, woody *shrub* to 2 m tall. *Branchlets* not (Just Range) or slightly ('Warang') glandular tuberculate, glabrous, glabrescent or sparsely and minutely pilose, becoming glabrous with age, hairs concentrated between slight leaf decurrencies, to 0.25 mm long. *Leaves* bipinnate, (3–)5–7-foliolate, lower pinnae usually ternate, entire leaf in outline (Just Range, 15–)30–56 mm long, (Just Range, 18–)28–90 mm wide, glabrous, not obviously glandular, glands drying black; petiole 7–17 mm long; rachis segments 7–18 mm long; terminal leaflets (4.5–)7–30 mm long, (Just Range, 0.5–)1–1.25 mm wide, linear, concolorous, dorsiventral, region of undifferentiated cells between the spongy and palisade mesophyll layers, flat, margin smooth, tip acute; lateral leaflets similar to terminal leaflets but longer except in ternate leaves, 7–25 mm long. *Inflorescence* (mature not seen for Just Range, description based on Warang material) 5–25^{+}-flowered, not obviously to slightly glandular, glabrous, shorter than leaves; peduncles 2–2.5 mm long, secondary inflorescence units 1–1.5 mm long; prophylls and metaxyphylls c. 0.5 mm long; anthopodia 1–1.5 mm long. *Sepals* ovate, 1–1.25 mm long, c. 1 mm wide, flat, not obviously glandular, ciliate or glabrous, tip obtuse. *Petals* white, c. 2 mm long, not obviously glandular, glabrous to minutely ciliate, persistent. *Staminal filaments* pilose, slightly glandular tuberculate towards apex; anther loculi glabrous, apiculum minutely pilose towards apex. *Gynoecium* glabrous; stigma entire, minute, scarcely wider than style. *Cocci* c. 3 mm long, c. 1.5 mm wide, glabrous. *Seed* dull, grey, c. 2.5 mm long, c. 1.5 mm wide, irregularly rugulose, wax platelets between tubercula.

Additional specimens examined: **QUEENSLAND**: BURKE: White Mountains, Hughenden, 20°19'S 144°49'E, *M. Godwin C2772*, viii.1984 (BRI); Wall Creek Gorge, White Mountains, 20°23'S 144°43'E, *M. Godwin C2744*, viii.1984 (BRI); 5 km SW of Clyde Park HS (new), 20°23'S 144°43'E, *E.J. Thompson HUG 52 and P. Sharpe*, 3.ix.1992 (AD, BRI, DNA *n.v.*); 41 km N of Torrens Creek, 20°25'S 145°00'E, *E.J. Thompson HUG264 and G. Turpin*, 30.v.1993 (BRI); *ibid*, 20°27'S 144°50'E, *E.J. Thompson HUG415, S. Figg, and K. Stephens*, 24.iv.1993 (BRI); Warang, NNW of Torrens Creek, 20°27'S 144°50'E, *R.J. Cumming 9671*, 29.iv.1990 (BRI); W branch of the Cape R., *R. Daintree s.n.* (MEL *280072*); White Mountains NP, E of Warang, 20°26'S 144°55'E, *B.S. Wannan 1667 and C. Martindell*, 30.iii.2000 (BRI *n.v.*, CANB *n.v.*, MEL, NSW *n.v.*); Just Range area, 6 km NNW of 'Liontown', 20°21'S 146°01'E, *E.J. Thompson 400 and P.A. Robins*, 6.xi.1991 (BRI, CANB, MEL).

Notes: *Boronia warangensis* appears to be most closely related to *B. montimulliganensis* from which it can be distinguished by the many-flowered inflorescences (cf. 1–3-flowered) and pilose anther appendages (cf. glabrous). *Boronia warangensis* and *B. occidentalis* do co-occur in places, and a collection by Daintree (MEL *280072*) is a mixed collection of the two species. *Boronia warangensis* can be distinguished from the latter by having distinct leaf decurrencies and larger leaves ((15–)30–56 mm long, (18–)28–90 mm wide; cf. 9–25 mm long, 7–25 mm wide). It differs from *B. bipinnata* by having slightly glandular tuberculate branchlets with distinctive leaf decurrencies and longer leaflets ((4.5–)7–30 mm long; cf. 1.5–9 mm long); and from the nearby *B. yarrowmerensis* by the distinctive leaf decurrencies (cf. very faint or absent).

The only known collection from Just Range (*Thompson 400*) has smaller leaves (entire leaf (15–)30–42 mm long, (18–)32–56 mm wide) that are usually trifoliolate, and narrower leaflets (0.5–1 mm wide) than that of specimens collected from Warang National Park. Unfortunately this collection has immature inflorescences and so mature flower, fruit and seed morphology is not known. Further collections and research are required to determine the taxonomic status of this isolated population.

Distribution and ecology: The species is confined largely to Warang National Park (White Mountains) with a disjunct population to the east in the Just Range (see *Notes*) (Fig. 1). The species is found in dissected sandstone country in scrub or woodland dominated by species of *Eucalyptus*, *Angophora*, *Lophostemon* or *Acacia* (collector's notes; pers obs.). Flowering March-September; fruiting material has been collected in April.

Conservation status: For *B. warangensis* a conservation code of 2RC- is appropriate, at least for the Warang populations which appear to be secure. Surveys are required to ascertain the correct taxonomic and conservation status of the Just Range population.

Etymology: The specific epithet refers to the area where the species is largely confined, Warang National Park or White Mountains.

4. *Boronia yarromerensis* Duretto, *sp. nov.*

A *Boronia bipinnata* Lindl. caulibus leviter glandulotuberculatis et foliolis longioribus differt; a *B. warangensis* Duretto et *B. montimulliganensis* Duretto foliis ad bases infirme decurrentibus vel non decurrentibus differt.

Type: QUEENSLAND: BURKE: About 21 km NNW of Yarromere Station homestead on Great Dividing Range, 21°17'S 145°48'E, *R.J. Henderson H2853, G.P. Guymer and H.A. Dillewaard*, 15.x.1983 (holotype BRI *AQ414567*; isotypes CANB, MEL). (Figs 2 G-H).

Boronia sp. (Yarromere R.J.Henderson H2853): E.M. Ross, '*Rutaceae*' In R.J.F. Henderson (ed.), *Queensland Vascular Plants: names and distribution*, 303 (1994); P.I. Forster, '*Rutaceae*' in R.J.F. Henderson (ed.), *Queensland Plants: names and distribution*, 185 (1997).

Erect, woody *shrub* to 0.5 m tall. *Branchlets* slightly glandular tuberculate, leaf decurrencies slight on new stems, quickly becoming obscure, sparsely hispidulous between leaf decurrencies, becoming glabrous with age, hairs to 0.25 mm long. *Leaves* imparipinnate or bipinnate, 3–7-foliolate, proximal leaflets sometimes ternate, entire leaf in outline 21–35 mm long, 24–44 mm wide, glabrous, not obviously glandular, glands drying black; petiole 6–13 mm long; rachis segments 5.5–10 mm long; terminal leaflets 5–17 mm long, 1–1.25 mm wide, linear, concolorous, flat, margins entire, tip acute; lateral leaflets similar to terminal leaflets but longer, (4–)7–15 mm long, 1–1.5 mm wide. *Inflorescence* 1–3(–7)-flowered, not obviously glandular, glabrous; peduncles 1–1.25 mm long, secondary inflorescence units 0.5–1 mm long; prophylls and metaxyphylls 0.5–1 mm long; anthopodia 1–2.5 mm long. *Sepals* circular, c. 1.5 mm long, c. 1.25 mm wide, flat, not obviously glandular, glabrous or minutely ciliate, tip obtuse. *Petals* white, 2–2.5 mm long, not obviously glandular, glabrous or minutely and sometimes sparsely ciliate, persistent. *Staminal filaments* pilose, glandular tuberculate towards apex; anthers glabrous, slightly apiculate. *Ovary* glabrous; style pilose; stigma entire, minute, scarcely wider than the style. *Cocci* c. 3 mm long, c. 1.5 mm wide, glabrous. *Seed* dull, grey, c. 2.5 mm long, c. 1 mm wide, irregularly rugulose, wax platelets between tubercula.

Additional specimens examined: **QUEENSLAND**: BURKE: 24 km SE of Torrens Creek, 20°58'S 145°20'E, *E.J. Thompson HUG514 and D.G. Baumgartner*, 26.x.1997 (BRI); about 22.5 km NNW of Yarromere Station homestead on Great Dividing Range, 21°17'S 145°48'E, *R.J. Henderson H2847, G.P. Guymer and H.A. Dillewaard*, 15.x.1983 (BRI, MEL).

Notes: *Boronia yarromerensis* and *B. bipinnata* appear to be closely related. The former is easily distinguished from the latter by the slightly glandular tuberculate branchlets and longer leaflets (5–17 mm long; cf. 1.5–9 mm long). The collection from south east of Torrens Creek (*Thompson HUG514*) has narrower leaflets than the more southerly collections. The collection is easily placed in *B. yarromerensis* on the basis of glandular stems with faint leaf decurrencies: characters that distinguish the species from both *B. warangensis* and *B. montimulliganensis*.

Distribution and ecology: The species is known from near 'Yarromere' Station (Fig. 1) where it is found in *Eucalyptus* forest or woodland on sandy soil in sandstone country (collector's notes). Flowering and fruiting material has been collected in October.

Conservation status: *Boronia yarromerensis* is known from three collections over a limited area, none of which are in a conservation reserve. An appropriate conservation code is 2V. Surveys are required to accurately determine population sizes and the extent of the species.

Etymology: The specific epithet refers to the station, 'Yarromere', where this species is found.

5. *Boronia bipinnata* Lindl., in Mitchell, *J. exped. trop. Australia* 225 (1848). *Type citation*: no type cited. *Type*: Subtropical New Holland, small straight shrub foot of rocks, Sub Tropical New Holland [near Mt Playfair, central Queensland, Warrego District, c. 25°03'S 147°10'E], *T.L. Mitchell 283* [or *311*], 11.ix.1846 (lectotype, here designated, CGE *n.v.* [left hand specimen of sheet of *B. bipinnata* labeled 'type' in Lindley's herbarium; transparency MEL *2041290*]); Subtropical New Holland, small straight shrub foot of rocks, *T. L. Mitchell 197* [or *187*], 6.iv.1846 (residual syntype, CGE *n.v.* [right hand specimen of *B. bipinnata* labeled 'type' in Lindley's herbarium at CGE; transparency MEL *2041290*]); New Holland, *T.L. Mitchell* (residual syntype TCD); tropical New Holland, *T.L. Mitchell 387*, 1846 (residual syntype NSW).

[*Boronia bipinnata* var. *typica* Domin, *Beitrage zur Flora und Pflanzengeographie Australiens* 839 (1926) [= *Bibliotheca Botanica* 89: 285 (1926)], *nom illeg., autonyme*. Note: Chapman (1991) lists *B. bipinnata* var. *bipinnata* Domin though Domin did not list the 'type' variety in this way.]

Boronia sp. (Nathan Gorge N.H. Speck 1925): E.M. Ross, '*Rutaceae*' in R.J.F. Henderson (ed.), *Queensland Vascular Plants: names and distribution*, 303 (1994); P.I. Forster, '*Rutaceae*' in R.J.F. Henderson (ed.), *Queensland Plants: names and distribution*, 185 (1997).

Boronia anemonifolia var. *anethifolia* Benth.: G. Bentham, *Fl. Austral.* 1: 322 (1863), p.p.; F.M. Bailey, *Queensl. fl.* 1: 188 (1889), p.p.; F.M. Bailey, *Compr. cat. Queensl. pl.* 76 (1913), p.p.

Illustration: S. Pearson and A. Pearson, *Plants of Central Queensland* 73 (1989), photograph.

Erect, woody *shrub* to 1(–1.5) m tall. *Branchlets* glandular tuberculate, glabrous or sparsely pilose between leaf decurrencies, becoming glabrous with age, hairs to 0.25 mm long. *Leaves* bipinnate or tripinnate, (3–5)–7–11-foliolate, lowermost pinnae usually divided into 3–5(–7) segments, next lower most 2–4 pinnae often divided into 3–5 pinnae, entire leaf in outline (13–)21–50 mm long, (10–)20–60 mm wide, glabrous or glabrescent, slightly glandular tuberculate or not, glands often drying black; petiole 4–15 mm long; rachis segments 2–10 mm long; terminal leaflets 1.5–9 mm long, 0.5–1 mm wide, linear, flat, concolorous, dorsiventral, dense region of large undifferentiated cells between the spongy and palisade mesophyll layers, margin entire, tip acute; lateral leaflets similar to terminal leaflets but usually longer, 1.5–15 mm long, 0.5–1 mm wide. *Inflorescence* (1–)7–21^{+}-flowered, glandular tuberculate, glabrous or glabrescent; peduncles 2–8 mm long, secondary inflorescence units 1–4 mm long; prophylls and metaxyphylls 0.5–1 mm long; anthopodia 1–3 mm long. *Sepals* circular to elliptic, with or without a short apiculum, 1–1.25 mm long and wide, flat, not obviously glandular, glabrous, tip acute. *Petals* white, 2.5–4 mm long, not obviously glandular, glabrous or minutely ciliate, persistent. *Staminal filaments* pilose, glandular tuberculate towards apex; anthers glabrous, apiculum reflexed. *Ovary* glabrous; style pilose; stigma entire, minute, scarcely wider than the style. *Cocci* (2–)3–3.5 mm long, 1–1.5 mm wide, glabrous or with a few hairs along the suture. *Seed* dull, grey, 2–2.5 mm long, 1–1.5 mm wide, irregularly rugulose, wax platelets between tubercula.

Additional specimens examined: **QUEENSLAND**: PORT CURTIS: 15 km NE of Biloela, 3 km N of Callide Dam in range, 24°20'S 150°38'E, *E.J. Thompson BIL37*, 3.vii.1992 (BRI); Callide Range, south of Gladstone-Biloela Rd, 24°14'S 150°35'E, *A.R. Bean 979*, 24.xi.1988 (BRI); LEICHHARDT: Blackdown Tableland, c. 9 km SW of campsite at old stockyard on Mimosa Ck, 23°5-'S 149°-'E, *R.J. Henderson 1096, L. Durrington and P. Sharpe*, ix.1971 (BRI, CANB, MEL); Blackdown Tableland, Stony Ck, 23°-'S 149°-'E, *K.A. Williams 80199*, 10.viii.1980 (BRI); Blackdown Tableland, Stony Ck Falls, 23°47'S 149°00'E, *I.R. Telford 5766*, 12.vi.1977 (CANB, NSW *n.v.*, BISH *n.v.*); c. 6 km westerly from Forestry Camp, Mimosa Ck, Blackdown Tableland, 23°49'S 149°07'E, *K.A. Williams 74037*, 3.ix.1974 (BRI, CANB); Salvator Rosa NP, Sentinel Mountain, 24°48'S 147°08'E, *M.E. Ballingall 2650*, 18.ix.1990 (BRI, CANB); Salvator Rosa NP, 170 km SW of Springsure, 24°51'S 147°13'E, *M.B. Thomas 254*, 22.ix.1987 (BRI, CANB); West of Mt Mooloolong, Carnarvon Range, SW of Springsure, *C.H. Gittins T38*, vii.1966 (BRI); Spyglass Peak, Salvator Rosa NP, 24°5-'S 147°1-'E, *M.R. Cockburn 37*, 28.i.1981 (BRI); Mt Playfair - Mt Faraday area, 24°5-'S 147°0-'E, *B. O'Keefe s.n.*, ix.1982 (BRI *AQ348662*); Nogoa R., Springsure, *E. Foot s.n.*, 1890 (MEL *262604*); Crest of Carnarvon Range, 25°1-'S 148°5-'E, *R.W. Johnson 1452*, 2.iii.1960 (BRI, CANB); 48 miles [c. 76.8 km] S of Rolleston, 25°1-'S 148°4-'E, *J.F. Bardsley s.n.*, 29.is.1971 (BRI *AQ1943*); Yarra Gorge, c. 70 miles [c. 112 km] SW of Springsure, *L.H. Cockburn s.n.*, xii.1966 (BRI *65083*); Carnarvon Range, *J.E. Young s.n.*, vii.1937 (BRI *66599*); Carnarvon, c. 86 km SW of Springsure, *R. Jordan s.n.*, viii.1953 (AD *9251143*); c. 49 km south of Carnarvon Gorge turnoff, on road to Injune, 25°16'S 148°38'E, *M.F. Duretto 325 and M. Bayly*, 12.ix.1992 (BRI, MEL); 'Wallaroo', 68 km N of Injune, 25°18'S 148°40'E, *A.R. Bean 6882*, 14.xi.1993 (BRI); Crest of Carnarvon Range, Expedition Range NP, Get Down section above Robinson Gorge, 25°18'S 149°10'E, *P.I. Forster 17700 and S.J. Figg*, 16.ix.1995 (BRI *n.v.*, MEL); Nathan Gorge, 12 miles [c. 19.2 km] SSW of Cracow on the Dawson River [25°27'S 150°09'E], *N.H. Speck 1925*, 28.x.1963 (BRI, AD, CANB); Nathan Gorge, 23 km SW of Cracow, side gorge of Cabbagetree Ck, 25°27'S 150°08'E, *I.R. Telford 11052 and R.J. Rudd*, 18.iv.1991

(CANB, NSW, PERTH); MARANOA: Mt Moffat, Carnarvon Range, *N. Geary s.n.*, ii.1944 (BRI *AQ150973*); Mt Moffat NP, c. 1 mile [c. 1.6 km] behind the homestead, *J. Thompson 5 and W. Morley*, xi.1981 (BRI); Long Gully Rd, 5 km N of Mt Moffat HS, 25°04'S 147°58'E, *V.J. Neldner 729 and M.B. Thomas*, 13.v.1982 (BRI); Mt Moffat Kookaburra Cave, 25°01'S 147°57'E, *K.A. Williams 86047*, 22.ix.1986 (BRI); Brandy Gully Rd, 4 km SE of Mt Moffat HS, 25°04'S 147°58'E, *V.J. Neldner 744 and M.B. Thomas*, 13.v.1982 (BRI); N of St George, Waroo Shire, 27°17'S 148°02'E, *C.M. Warrian 981*, 11.iv.1991 (BRI).

Notes: *Boronia bipinnata* was considered to be a widespread species found in both Queensland and New South Wales (e.g. Stanley & Ross 1983; Weston & Porteners 1991; Weston & Duretto 2002). Stanley and Ross (1983), Ross (1994) and Forster (1997) identified a number of forms that possibly warranted taxonomic recognition (see *B. warangensis*, *B. yarromerensis* and *B. inflexa*). One of these 'undescribed' forms was *B.* sp. (Nathan Gorge N.H. Speck 1925). The type material (see above) has bipinnate leaves with 5–9-leaflets and petioles c. 10 mm long, and peduncles to 6 mm long. These features align the type material with the more geographically restricted taxon that has been called *B.* sp. (Nathan Gorge N.H. Speck 1925) and not the widespread taxon. The widespread taxon requires a new name and is described as *B. occidentalis* below. Lindley (in Mitchell 1848, p. 225) indicated that the first plant of *B. bipinnata* that Mitchell encountered had sub-solitary flowers. The type material has inflorescences with one, two or more open flowers per inflorescence. The inflorescences appear to be young, with many unopened buds, and a complex order of branching.

The widespread and common species referred to as *B. bipinnata* in some recent accounts (e.g. Lebler 1972, 1977; Williams 1980; Stanley & Ross 1983; Batianoff & Dillewaard 1988; Weston & Porteners 1991; Ross 1994; Forster 1997; Weston & Duretto 2002) is *B. occidentalis* (see below). *Boronia bipinnata* can be distinguished from *B. occidentalis* (and *B. inflexa*, *B. montimulliganensis, B. warangensis* and *B. yarromerensis*) by the combination of the larger and more dissected leaves, distinctly glandular tuberculate stems, and multi-flowered inflorescences with large peduncles and secondary inflorescence units (see key).

Boronia bipinnata is probably most closely related to *B. yarromerensis.* It can be distinguished from that species by usually being hispidulous between the distinct leaf decurrencies, smaller terminal leaflets (1.5–9 mm long; cf. 5–17 mm long), long peduncles (2–8 mm long; cf. 1–1.25 mm long), and the large number of flowers per inflorescence ((1–)7–21^{+}-flowered, cf. 1–3(–7)-flowered).

Boronia bipinnata is found in four disjunct areas and each population is slightly different. Plants from Salvator Rosa and Carnarvon National Parks (the type form) are less glandular verrucose than plants from the Blackdown Tableland and Nathan Gorge. Plants from Blackdown Tableland have the smallest (on average) leaves and inflorescence parts while plants from Nathan Gorge have the largest (on average) leaves and inflorescence parts. In the Rolleston/Springsure areas this species may intergrade with *B. occidentalis* (see discussion under that species below). The large flowered 'form of *B. bipinnata*' from the Granite Belt (Qld) and Torrington (NSW) noted by Stanley and Ross (1983) and Weston and Duretto (2002) is *B. inflexa* (see below).

Pearson and Pearson (1989) noted that the pollen of this species was eaten by Aborigines. Galbraith (1977) called this species the Bipinnate Boronia.

Distribution and ecology: *Boronia bipinnata* is found in the Central Highlands of Queensland and surrounds and disjunctly east at Nathan Gorge, Callide Range and to the north-east on the Blackdown Tableland, and south-east near St George (Fig. 1). The species is usually found in *Eucalyptus* forest or woodland on sandstone, on both flat areas and steep slopes. *Boronia bipinnata* was found to be self compatible by Weston *et al.* (1984) though they may have been working with material of *B. occidentalis*. Flowering September-June; fruiting October-June.

Conservation status: The species is found in several large reserves over its range and is probably secure.

Etymology: The epithet presumably alludes to the bipinnate leaves which are characteristic of this species.

6. *Boronia occidentalis* Duretto, *sp. nov.*

A *Boronia bipinnata* foliis minoribus, minus dissectis et inflorescentiis floribus paucioribus compositis differt.

Type: QUEENSLAND: DARLING DOWNS: Head of Pariagara Ck, Wondul Range, 28°11'S 151°02'E, *P.I. Forster 9795 and P. Machin*, 12.iv.1992 (holotype BRI *AQ542640*; isotypes MEL *711261*, PERTH *2687437*).

Boronia bipinnata var. *pubescens* Domin, *Beitrage zur Flora und Pflanzengeographie Australiens* 839 (1926) [= *Bibliotheca Botanica* 89: 285 (1926)]. *Type citation*: "Queensland: Sandsteinhugel der Dividing Range bei Pentland (DOMIN. II. 1910)." *Type*: *n.v.*; description decisive.

["*Boronia bipinnata*" *auct. non* Lindl.: T.D. Stanley and E.M. Ross, *Fl. South East Queensland* 1: 451 (1983), p.p.; G.N. Batianoff and H.A. Dillewaard, *Port Curtis District Flora and early Botanists*, p. 114 (1988); P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 231 (1991), p.p.; P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 270 (2002), p.p.]

["*Boronia anethifolia*" *auct. non* A.Cunn. ex Endl.: N.W. Beadle and L.D. Beadle, *Students Fl. North East New South Wales* 4: 555 (1980), p.p.]

Illustrations: K.A.W. Williams, *Native Plants Queensland* 1: 32 (1980), photograph, as *B. bipinnata*; T.D. Stanley and E.M. Ross, *Fl. South East Queensland* 1: 451, Fig. 69F (1983), as *B. bipinnata*; P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 231 (1991), as *B. bipinnata*; P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 270 (2002), as *B. bipinnata* (left hand specimen).

Erect, woody *shrub* to 1 m tall. *Branchlets* not or slightly glandular tuberculate, with or without very slight leaf decurrencies, glabrous or hispidulous, becoming glabrous with age, hairs usually concentrated between leaf decurrencies, to 0.25 mm long. *Leaves* imparipinnate or bipinnate, 3–7-foliolate, lower pinnae usually ternate, entire leaf in outline, 9–25 mm long, 7–25 mm wide, glabrous to sparsely hispidulous on lower parts or rarely hispidulous (Qld), not obviously to slightly glandular tuberculate, glands often drying black; petiole 3–7 mm long; rachis segments 2–6 mm long; terminal leaflets 1–4(–7) mm long, 0.5–1 mm wide, narrowly elliptic to narrowly oblanceolate to linear, flat, concolorous, dorsiventral, dense region of large undifferentiated cells between spongy and palisade mesophyll layers, margins entire, tip acute to obtuse, sometimes recurved; lateral leaflets similar to terminal leaflets but longer, 2–9(–13) mm long, 0.75–1.5 mm wide. *Inflorescence* 1–3(–9)-flowered, usually 1–3 flowers flowering per inflorescence at any one time, not obviously to slightly glandular, glabrous to sparsely hispidulous; peduncles 0.5–2 mm long, secondary inflorescence units c. 0.5 mm long; prophylls and metaxyphylls 0.75–1 mm long; anthopodia 0.5–2 mm long. *Sepals* deltate, 1.25–2.5 mm long, 0.75–2 mm wide, not obviously glandular, adaxial surface glabrous, abaxial surface glabrous or ciliate or rarely hispidulous, tip acute or slightly apiculate. *Petals* white, 2–3(–4) mm long, not obviously glandular, glabrous, persistent. *Staminal filaments* pilose along margins, slightly glandular towards apex; anthers glabrous, apiculum minute. *Ovary* glabrous; style pilose, sometimes only at base; stigma entire, minute, scarcely wider than the style. *Cocci* 2–2.5 mm long, c. 1.5 mm wide, glabrous. *Seed* dull, grey, 2–2.5 mm long, c. 1 mm wide, irregularly rugulose, wax platelets between tubercula. **Rock Boronia**.

Representative specimens (c. 160 specimens examined): **QUEENSLAND**: BURKE: Poison Ck, 14 miles [c. 22.4 km] north of Mt Sturgeon [19°57'S 144°17'E], *R.A. Perry 3668*, 28.vi.1953 (BRI,

CANB); NORTH KENNEDY: Pear Rock, Mt Stewart Range, 'Allandale', 20°20'S 145°31'E, *P.I. Forster 16619 and S.J. Figg*, 16.v.1995 (BRI, NSW); Burra Range, West Pentland, 20°43'S 145°12'E, *B. Gray 556*, 12.vi.1977 (BRI, QRS); Just north of Burra Range lookout, White Mountains NP, 20°43'S 145°13'E, *A.R. Bean 4829*, 24.vii.1992 (BRI, NSW *n.v.*); LEICHHARDT: Blackdown Tableland, c. 35 km SE of Blackwater (campsite at old Stockyard on Mimosa Ck), 23°5-'S 149°0-'E, *R. Henderson H1096, L. Durrington and P. Sharpe*, ix.1971 (BRI *AQ14290*, MEL [locality questionable - see below]); Watershed E of Rolleston Township, *Story and Yapp 267*, 27.ix.1962 (AD, BRI, CANB, MEL); Expedition Range, *C.H. Gittins 358*, viii.1968 (BRI); 74 km NE of Tambo, Bauhinia Shire, 24°33'S 146°38'E, *E.R. Anderson 4603*, 2.iii.1989 (BRI); Isla Gorge, about 18 miles [c. 28.8 km] SW of Theodore, 25°09'S 149°57'E, *S.L. Everist 8036*, 28.viii.1968 (AD, BRI, CANB, MEL); Robinson Gorge NP, Starkvale Ck below campsite, 25°18'S 149°11'E, *P.I. Forster 11332 and P.R. Sharpe*, 11.ix.1992 (BRI, MEL); Gurulmundi, *M.E. Phillips s.n.*, 24.viii.1961 (CANB *CBG7403*); 'Wallaroo', 66 km N of Injune, 25°19'S 148°40'E, *A.R. Bean 6868*, 14.xi.1993 (BRI); 64.5 km N of Injune, just N of Wallaroo Station turnoff, 25°23'S 148°42'E, *D.L. Jones 6280 and B.E. Jones*, 25.viii.1990 (BRI, CANB); c. 20 miles [c. 32 km] ENE of Wandoan [Wandoan is 26°07'S 149°58'], *R.W. Johnson 803,* 25.vi.1959 (BRI); MITCHELL: Black's Palace, c. 70 miles [c. 112 km], ENE of Blackall, *S.L. Everist 1977*, 9.ii.1940 (BRI); *ditto, S.L. Everist 1882*, viii.1939 (BRI); BURNETT: On Monto Rd, 6.7 km N of Eidsvold, 25°19'S 151°07'E, *P.I. Forster 4788*, 12.x.1988 (BRI, CANB, DNA *n.v.*); Eidsvold to Cracow Rd, 1 km N of Little Morrow Ck crossing, 25°25'S 150°57'E, *P.I. Forster 9745 and P. Machin*, 9.iv.1992 (BRI, MEL, PERTH); 6.7 km along Gurgeena Plateau Rd, off Mundubbera to Gayndah Rd, 25°29'S 151°23'E, *P.I. Forster 5653*, 23.viii.1989 (BRI, CANB, MEL); WARREGO: Mt Brandon, 25°15'S 147°30'E, *S.T. Blake 11158*, 8.4.1936 (BRI); C. 30 km NE of Morven, near base of low jump-up about 1 km E of Morven to Winneba Station Rd, 26°11'S 147°13'E, *R.J. Henderson H3382, D. Jermyn and A. Franks,* 28.viii.1990 (BRI, MEL); DARLING DOWNS: Barakula SF, 5 km SE of Alburn Rd crossing of Hellhole Ck, 26°22'S 150°44'E, *I.R. Telford 11861 and J. Nightingale*, 6.xi.1993 (CANB, MEL, NSW, PERTH); 'Western Creek' Homestead, near Milmerran, *M.R.O. Millet s.n.*, v.1939 (CANB *259370*); PORT CURTIS: Port Clinton (portion 2), *R. Brown s.n.*, 22.viii.1802 (CANB *278465*); Clinton Lowland, Shoalwater Bay area, 22°35'S 150°42'E, *E.J. Tompson 82*, 10.ii.1992 (BRI, CANB); between Monkey Point and Long Beach, Great Keppel Is., 23°11'S 150°57'E, *G.N. Batianoff 9750 and H.A. Dillewaard*, 16.xi.1987 (BRI, CANB, NSW); WIDE BAY: Fraser's Is., *F.M. Bailey s.n.* (NSW *385914*); MORETON: Mt French, *E.G. Smith s.n.*, xii.1942 (BRI *150984*); Portion 158 Campbell (Stockyard Ck near Helidon), 27°40'S 152°05'E, *W.J.F. McDonald 595,* 18.ix.1974 (BRI); **NEW SOUTH WALES**: NORTH WEST SLOPES: 1.9 km E of Yetman-Yelarbon Rd on track to Holdfast Rd, 28°47'S 150°45'E, *R.G. Coveny 14469 and R.O. Makinson*, 7.x.1990 (BRI, CANB, NSW); Pilliga SF, c. 8 km N of Break Rd, 30°51'S 149°16'E, *G.J. White and J.L. Charley*, 5.xi.1985 (MEL, NE, NSW); CENTRAL WESTERN SLOPES: W side of Mendooran-Dubbo Rd, 27 km SE of Mendooran, 32°00'S 148°56'E, *P.C. Jobson 1883 and D.E. Albrecht,* 11.i.1993 (MEL); NORTH COAST: Smiths Ck, 7 miles (c. 11.2 km) NE of Ramornie [29°33'S152°47'E?], *W.F. Blakely and L.W.C. Shiress s.n.*, vii.1922 (NSW *373846*).

Notes: The density of the indumentum on the leaves and stems of *B. occidentalis* is variable. The majority of plants have pubescent stems (sometimes the hairs are concentrated between the leaf decurrencies) and leaves with a few hairs proximally. Some plants in the North Kennedy (e.g. *Gray 556*) and Leichhardt (e.g. *Johnston 803*) Districts of Queensland have glabrous stems and leaves while others from the North Kennedy (e.g. *Bean 4829*), Leichhardt (e.g. *Anderson 4603*), Mitchell (e.g. *Everist 1882*) and Warrego (e.g. *Blake 11158*) Districts have pubescent leaves and stems. Sepals on these latter specimens are also pubescent abaxially unlike the majority of specimens which have glabrous or ciliate sepals. It is this variation that Domin (1926) was describing when he described *B. bipinnata* var. *pubescens* (see above). Domin (1926) also described *B. bipinnata* var. *typica* (see *B. bipinnata*: he lists several glabrescent plants of *B. occidentalis* with the type of *B. bipinnata*). Pubescent and glabrescent specimens of *B. occidentalis* have been collected in some areas, e.g. Burra Range (e.g. *Gray 556, Bean 4829*) and Black's Palace (*Everist 1977, Everist 1882*) of north Queensland.

Sepal size in *B. occidentalis* is variable and ranges from 0.75 mm to 2.75 mm in length though most plants have sepals that are between 1 and 1.5 mm long. The sepals of some

plants scattered in an area bound by Monto, 'Wallaroo' (Qld) and Yetman (NSW), e.g. near Eidsvold (*Forster 4788*), Barakula State Forest (*Telford 11861*), 'Wallaroo' Station (*Bean 6868, Jones 6280*) and near Yetman (*Coveny 14469*), have particularly large deltate sepals (2–2.75 mm long, 1.5–2 mm wide) that overlap at the base when the flower is open. Scattered throughout this area and sometimes quite close to these specimens (e.g. *Forster 9745, 5653* from near Eidsvold) are specimens with smaller sepals (0.75–1 mm long and wide) that do not overlap at the base when the flower has opened. The character does not appear to have taxonomic value though it would be interesting to complete surveys between these populations to ascertain whether this character grades and/or if sepal size is determined by environmental and/or genetic factors.

Some collections from the Central Highlands near Rolleston (*Storey and Yapp 267*), Expedition Range (*Gittins 358*), Robinson Gorge (*Forster and Sharpe 11332*), Isla Gorge (*Everist 8036*) and Gurulmundi (*Phillips s.n.*, CANB *CBG7403*) have, as with *B. bipinnata* which is found nearby (see account above), slightly to strongly glandular verrucose stems and smaller sepals (0.75–1 mm long). A number of these collections (*Everist 8036, Gittins 358, Phillips s.n.* [CANB *CBG7403*]), though in bud, appear to have several flowers per inflorescence, also as with *B. bipinnata*. The petals (c. 2 mm long), leaves (smaller and not deeply dissected, except in *Storey and Yapp 267* but here the leaflets are not very narrow) and peduncles and secondary inflorescence units (both <1 mm long) are similar to that found in *B. occidentalis* and smaller than that of *B. bipinnata*. These collections are found between the three areas where *B. bipinnata* is found (Nathan Gorge/Callide Range, Blackdown Tableland, and the Central Highlands). *Boronia bipinnata* has been collected nearby from Robinson Gorge (*Forster 17700*, see above). In this treatment the above specimens are placed in *B. occidentalis.* These populations warrant further field investigations. This variation and problematic populations are reminiscent of the problems associated with *B. duiganiae* Duretto and *B. odorata* Duretto which are largely confined to the Central Highlands (see Duretto 1999a, 1999b).

The material from the Port Curtis District (see above) has finer leaves than inland specimens. These plants are of note as some are prostrate (collector's notes) and are part of the foredune community.

The taxon called *B. bipinnata* by Lebler (1972, 1977), Williams (1980), Stanley and Ross (1983), Batianoff and Dillewaard (1988), Weston and Porteners (1991) and Weston and Duretto (2002) (and this list is not exhaustive) is referable, apart from the large flowered form from the granite belt (= *B. inflexa*, see below), to *B. occidentalis* (see discussion under *B. bipinnata* above). *Boronia occidentalis* differs from *B. bipinnata* by the smaller (9–25 mm long, 7–25 mm wide; cf. (13–)21–50 mm long, (10–)20–60 mm wide) and less dissected leaves and the smaller number of flowers per inflorescence (1–3(–9); cf. (1–)7–21^{+}).

Mueller (1875) refers to specimens of *B. occidentalis* from Newcastle Range, Gilbert River and Cape River (all Qld) as bipinnate varieties of *B. polygalifolia*. Mueller had a very broad concept of *B. polygalifolia* that never gained wide acceptance (see discussion under *B. polygalifolia*).

Distribution and ecology: *Boronia occidentalis* is one of the most widely distributed species of *Boronia* and the only species that extends from north Queensland to New South Wales. It is found from near Mt Sturgeon (N Qld) along the Great Divide to the Central Highlands and then east to the Gurgeena Plateau, the Shoalhaven Bay-Yeppoon area, Great Keppel Is., and then south-west of the Great Divide to Inverell and Yetman (NSW) (Fig. 3). Additional populations are found further south in the Pilliga Scrub and Goonoo Goonoo State Forest (NSW).

In Queensland isolated collections have also been made on the Blackdown Tableland (*Henderson H1096*), Fraser Island (*Blakely s.n.*, NSW *385914*), and north-eastern New South Wales from near Ramornie (*Blakely and Shiress s.n.*, NSW *373846*) although these require confirmation.

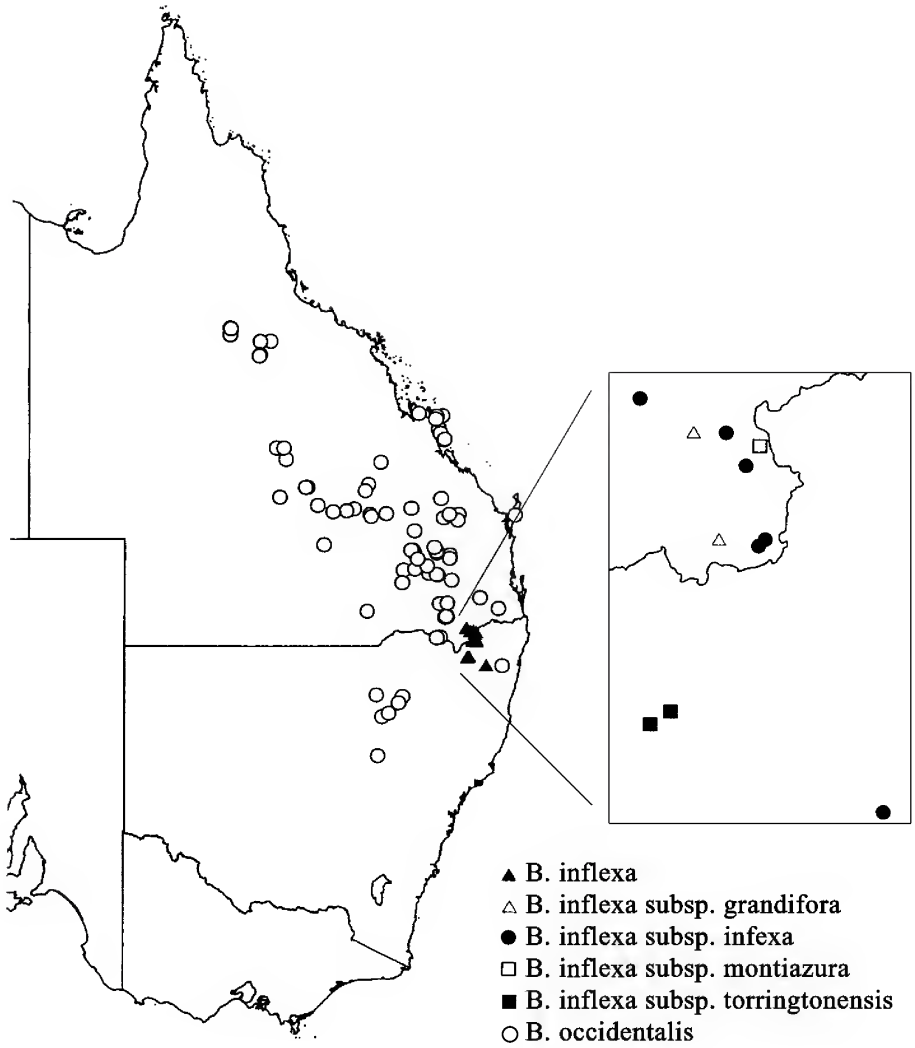

Figure 3. Distribution of *B. inflexa*, *B. inflexa* subsp. *grandiflora*, *B. inflexa* subsp. *inflexa*, *B. inflexa* subsp. *montiazura*, *B. inflexa* subsp. *torringtonensis*, *B. occidentalis*.

The Blackdown Tableland collection is part of a mixed collection of *B. occidentalis* and *B. bipinnata*. The latitude and longitude given by Williams (1980, p. 32) indicated that the plant called *B. bipinnata* by him came from the Blackdown Tableland. This material appears to be *B. occidentalis* on the basis of few flowers per inflorescence and the small pinnate leaves. The only collection of a specimen of *B.* section *Cyanothamnus* made by Williams from the Blackdown Tableland, and seen by the author, is referable to *B. bipinnata*.

Boronia occidentalis is usually found growing on sandstone or in sandy areas, in heath, woodland or forest. In the Port Curtis District it is found on or behind foredunes where it is sometimes prostrate. *Boronia bipinnata* was found to be self compatible by Weston *et al.* (1984) though they may have been working with material of *B. occidentalis*. Flowering and fruiting mainly February-October.

Conservation status: *Boronia occidentalis* is widespread, found in several reserves and is probably secure. Most populations in reserves are found in southern Queensland. Plants are rarely collected in north Queensland and populations in New South Wales are poorly documented, despite 30 odd collections from the Pilliga Scrub. Field research in these areas is required to determine the conservation status of the species across its range.

Etymology: The epithet is derived from the Latin, *occidentalis* (western), and alludes to the fact that, for most of the east coast of Australia, this species is the westernmost Boronia.

7. *Boronia inflexa* Duretto, *sp. nov.*

A *Boronia bipinnata* Lindl. foliis brevioribus semel tantum pinnatim divisis, sepalis et petalis grandioribus differt.

Type: QUEENSLAND: DARLING DOWNS: Mt Norman, Girraween NP, 28°52'S 151°58'E, *J. Armstrong 1149 and J.M. Powell*, 27.ix.1977 (holotype BRI *AQ383403*; isotypes CANB *8305848*, NSW *385918*). (Figs 2 I-K).

["*Boronia bipinnata*" *auct. non* Lindl.: T.D. Stanley and E.M. Ross, *Fl. South East Queensland* 1: 451 (1983), p.p.; P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 231 (1991), p.p.; P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 270 (2002), p.p]

Erect, woody *shrub* to 2 m tall and 3 m wide. *Branchlets* not or slightly glandular tuberculate, hispidulous or pilose, hairs concentrated between leaf decurrencies, becoming glabrous with age, hairs to 0.5 mm long. *Leaves* imparipinnate or rarely bipinnate (subsp. *inflexa*), 3–5(–7)-foliolate, entire leaf in outline 6–25 mm long, 6–35 mm wide, not obviously glandular, glabrous to minutely pilose; petiole 3–10 mm long; rachis segments 3.5–9 mm long; terminal leaflets 1–16 mm long, 0.5–2.5 mm wide, linear, flat, concolorous, dorsiventral, dense region of large undifferentiated cells between the spongy and palisade mesophyll layers (subsp. *inflexa*), margin entire, tip acute; lateral leaflets similar to terminal leaflets or longer, 1.5–16 mm long. *Inflorescence* 1–3(–7)-flowered, not obviously glandular, glabrous or glabrescent, smaller to slightly longer than leaves; peduncles 0.5–9 mm long, secondary inflorescence units 0.5–1 mm long; prophylls 0.5–3 mm long, glabrous or glabrescent with few hairs towards apex or minutely ciliate; metaxyphylls 0.5–1.5 mm long; anthopodia 1–3 mm long. *Sepals* deltate to narrowly deltate, 1.5–3 mm long, 0.75–1.5 mm wide, not obviously glandular, flat, glabrous to minutely ciliate, tip acute or acuminate due to involute margins. *Petals* white to pink, 2.5–7.5 mm long, not obviously glandular, glabrous to minutely ciliate, persistent. *Staminal filaments* pilose, slightly glandular tuberculate towards apex; anther loculi glabrous, apiculum minute, glabrous to pilose. *Ovary* glabrous; style glabrescent to pilose; stigma entire, minute, scarcely wider than the style. *Cocci* 3–3.5 mm long, 1–2 mm wide, glabrous or with few hairs along suture. *Seed* dull, grey, 2.5–3 mm long, 1–1.5 mm wide, irregularly rugulose, without wax platelets between tubercula. (Figs 2 I-R).

Notes: *Boronia inflexa* differs from *B. bipinnata* by the smaller pinnate leaves (6–25 mm long, 6–35 mm wide; cf. leaves bipinnate or tripinnate, (13–)21–50 mm long, (10–)20–60 mm wide) and larger sepals (1.5–3 mm long; cf. 1–1.25 mm long) and petals (2.5–7.5 mm long; cf. 2.5–4 mm long). Stanley and Ross (1983) discussed what are here recognized as subspecies of *B. inflexa* as variants of *B. bipinnata*, viz. specimens from the granite belt with elongate acute sepals (1.5–3 mm long), and purple tinged petals (4–7 mm long), and often trifoliolate or pinnate leaves. Weston and Duretto (2002) refer to a large-flowered form of *B. bipinnata* from Torrington (see subsp. *torringtonensis*) and the granite belt of southern Queensland (see subsp. *grandiflora*). McDonald *et al.* (1995) listed a taxon affiliated with *B. bipinnata* from Girraween National Park that could only be *B. inflexa* subsp. *inflexa* (see below).

Distribution and ecology: The species is found in three disjunct areas: the granite belt of south-east Queensland from the Stanthorpe area to Girraween National Park (subsp.'s *inflexa*, *montiazura*, *grandiflora*), and in New South Wales in the Gibraltar Range National Park (subsp. *inflexa*) and the Torrington area (subsp. *torringtonensis*) (Fig. 3). The species occurs in heath, woodland and forest on granite and granite derived soils. Flowering July-January; fruiting August-December.

Conservation status: All four subspecies of *B. inflexa* are poorly collected (22 collections in total, 12 of which are assigned to subsp. *inflexa*) with all but three of the collections being made prior to 1980. Only the type subspecies has been collected from a reserve. Like other Boronias restricted to the Granite Belt, viz. *B. amabilis*, *B. granitica* Maiden & Betche, *B. repanda* (F.Muell. ex Maiden & Betche) Maiden & Betche and *B. sp. aff. granitica* (see Duretto 1999b), *B. inflexa* appears to be rare, probably vulnerable or endangered, and in urgent need of surveys to determine the extent and security of all populations. A conservation code for the entire species of 3EC- is appropriate.

Etymology: The epithet is derived from the Latin, *inflexus*, and refers to the involute or inflexed margins of the sepals near the tips, which often give them their acuminate appearance.

Key to the subspecies of B. inflexa

1. Leaflets minutely pilose 2
1: Leaflets glabrous or glabrescent 3
2. Petals 2–3.5 mm long; anther apiculum glabrous ..... **7a.** subsp. ***inflexa***
2: Petals 6.5–7 mm long; anther apiculum with few simple hairs ..... **7c.** subsp. ***grandiflora***
3. Terminal leaflets 3–7 mm long, 0.5–0.75 mm wide ..... **7b.** subsp. ***montiazura***
3: Terminal leaflets (4–)10–16 mm long, (0.75–)1–1.25 mm wide ..... **7d.** subsp. ***torringtonensis***

7a. *Boronia inflexa* Duretto subsp. ***inflexa***

["*Boronia bipinnata*" *auct. non* Lindl.: T.D. Stanley and E.M. Ross, *Fl. South East Queensland* 1: 450 (1983), p.p.; P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 231 (1991), p.p.; P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 270 (2002), p.p.]

Boronia sp. aff. B. bipinnata: B. McDonald, C. Gravatt, P. Grimshaw, and J. Williams, *The Flora of Girraween and Bald Rock National Parks*, 85 (1995).

Erect, woody *shrub* to 0.8 m tall. *Branchlets* not to slightly glandular tuberculate, pilose between leaf decurrencies, hairs to 0.5 mm long. *Leaves* imparipinnate (SE Qld) or rarely with few bipinnate leaves with ternate lower leaflets (NE NSW), 3–5-foliolate, entire leaf in outline 8–18(–22 NE NSW) mm long, 8–16(–28 NE NSW) mm wide, minutely pilose; petiole 5–9 mm long; rachis segments 3.5–5.5 mm long; terminal leaflets 1–10.5 mm long, 0.75–1 mm wide, dorsiventral, dense region of large undifferentiated cells between the spongy and palisade mesophyll layers; lateral leaflets similar to terminal leaflets but longer, 1.5–11 mm long. *Inflorescence* 1–3-flowered, smaller than leaves; peduncles 0.5–4 mm long; prophylls 1–1.5 mm long, with few apical hairs; anthopodia 1–1.5 mm long. *Sepals* deltate, 1.5–2.5 mm long, 0.75–1 mm wide, glabrous or with a few hairs towards apex, tip acute or acuminate due to involute margins. *Petals* white to pink, 2.5–3.5 mm long, glabrous or with few hairs towards apex. *Anther apicula* glabrous. *Style* pilose. *Cocci* (Qld material seen only) 3–3.5 mm long, 1–1.5 mm wide, glabrous or with few hairs along suture. *Seed* (Qld material seen only) c. 3 mm long, c. 1.5 mm wide. (Figs 2 I-K).

Additional specimens examined: **QUEENSLAND**: DARLING DOWNS: Amiens, 10 miles [c. 16 km] WNW of Stanthorpe, *G. Ward 347*, xii.1966 (BRI); Poziers 5 miles [c. 8 km] NNW of Stanthorpe, *B.C. Dodd s.n.*, 26.x.1966 (BRI *AQ151005*); Near Stanthorpe, 28°40'S 151°56'E, *C.W. Frazier s.n.*, x.1966 (NE *50497*); Portion 123 Broadwater (northern side of Girraween), *P.*

Grimshaw 78, 31.vii.1974 (BRI); Mt Norman, 7 km NE of Wallangarra, 28°52'S 151°58'E, *I.R. Telford 3128*, 25.ix.1973 (CANB); Mt Norman, 5 miles [c. 8 km] NE of Wallangarra, between the two peaks, 28°51'S 151°59'E, *D. Hockings s.n.*, 6.xii.1970 (BRI *AQ113083*); Girraween NP, near Wallangarra, 28°52'S 151°58'E, *S.T. Blake 23706*, 4.xi.1971 (BRI); Wallangarra, 28°56'S 151°56'E, *W.W. Abell s.n.*, 29.x.1973 (BRI *AQ175462*); **NEW SOUTH WALES**: NORTHERN TABLELANDS: Gibraltar Range NP, c. 65 km E of Glen Innes on highway, 29°32'S 152°17'E, *M.F. Duretto 685-686, P.G. Neish and I. Thompson*, 26.x.1995 (*MFD685* – MEL, NSW; *MFD686* – MEL); Gibraltar Range NP, 29°34'S 152°15'E, *J.B. Williams s.n.*, 11.ii.1974 (NE *45651*); Gibraltar Range NP, 40 miles [c. 64 km] NE of Glen Innes, 29°32'S 152°17'E, *J.B. Williams s.n.*, 3.xi.1970 (NE *29192*).

Notes: In *B. inflexa* only the specimens from Gibraltar Range have bipinnate leaves. They also differ in having more elliptic leaflets, and a denser indumentum on the branches. These specimens are placed in *B. inflexa* because of sepal shape and the relatively long branch hairs (0.5 mm long, as compared to *B. occidentalis*, which has hairs 0.1–0.25 mm long).

Distribution and ecology: *Boronia inflexa* subsp. *inflexa* is found from near Stanthorpe to Girraween National Park (SE Qld), and disjunctly at Gibraltar Range (NE NSW) (Fig. 3). The majority of collections came from Mt Norman, Girraween National Park. McDonald *et al.* (1995) noted that the taxon (listed as *B. sp. aff. B. bipinnata*) is found growing in heaths and shrublands of rocky [granite] areas. They also note that the taxon is not known from the nearby Bald Rock (NSW). Flowering July-December; fruiting October-December.

Conservation status: The subspecies is rare and poorly collected with most collections made in the 1970's. The only population seen by the author was at Gibraltar Range which consisted of very few plants. These plants were growing in a large population of *B. anethifolia*. Though two of the populations are within large national parks and are probably secure, surveys are required to correctly ascertain the status of this subspecies. Collections have not been made from near Stanthorpe for approximately 25 years and this area warrants special attention. The population on Mt Norman consists of very few plants (Girraween NP ranger, pers. com. 1995) and this area is a popular walking destination. A conservation code of 2EC- is appropriate.

7b. *Boronia inflexa* subsp. ***montiazura*** Duretto, *subsp. nov.*

A subspecie typica foliis angustissimis glabris vel glabratis differt.

Type: QUEENSLAND: DARLING DOWNS: Applethorpe, Blue Mountain, 28°37'S 151°58'E, *B.C. Dodd A3-12-1*, 20.xi.1973 (holotype BRI *AQ12434*). (Figs 2 L-M).

["*Boronia bipinnata*" *auct. non* Lindl.: T.D. Stanley and E.M. Ross, *Fl. South East Queensland* 1: 451 (1983), p.p.]

Shrub to 2 m tall and 3 m wide. *Branchlet*s not or slightly glandular tuberculate, sparsely pilose between leaf decurrencies, hairs to 0.5 mm long. *Leaves* imparipinnate, 3(–5)-foliolate, entire leaf in outline (6–)10–15 mm long, (6–)8–15 mm wide, glabrous or glabrescent; petiole 3–7 mm long; rachis segments 4–4.5 mm long; terminal leaflets 3–7 mm long, 0.5–0.75 mm wide; lateral leaflets similar to terminal leaflets. *Inflorescence* 1–3(–7)-flowered, smaller or slightly longer than leaves; peduncles 1–9 mm long; prophylls 0.5–2.5 mm long, minutely ciliate; anthopodia 1.5–2.5 mm long. *Sepals* narrowly deltate, 1.5–2 mm long, c. 0.75 mm wide, minutely ciliate, tip acute. *Petals* 4–5 mm long, minutely ciliate. *Anther apicula* with a few simple hairs. *Style* pilose. *Cocci* 3–3.5 mm long, c. 1.5 mm wide, glabrous. *Seed* c 2.5 mm long, c. 1 mm wide.

Additional specimens examined: **QUEENSLAND**: DARLING DOWNS: Blue Mountain, near Stanthorpe, *F.D. Hockings s.n.*, vi.1962 (BRI *AQ151007*); Stanthorpe district (Applethorpe), *M.P. Fletcher s.n.*, xii.1974 (NSW *385910*); NE of Stanthorpe, *Boorman s.n.*, vii.1904 (BRI *AQ151003* & *AQ151008*, NSW *126444*).

Notes: *Boronia inflexa* subsp. *montiazura* differs from the type, and geographically closest, subspecies by the very narrow (0.5–0.75 mm wide; cf. 0.75–1 mm wide) and glabrous or glabrescent leaves (cf. pilose). Maiden and Betche (1904) recorded the collection of this taxon made by Boorman in 1904 as *B. falcifolia*, a coastal species (see below). This error was noted by Cheel (1929) who considered that the specimen was referable to *B. bipinnata*.

Distribution and ecology: This subspecies is restricted to Blue Mountain, a relatively small hill near Applethorpe, north of Stanthorpe (SE Qld) (Fig. 3). All collections were made from plants growing on granite amongst boulders, or in fissures on smooth rock faces. A note by Boorman on his collections states 'This plant is found only in one locality to the north east of the Township on the side of a very smooth rock…'. Flowering July-December; fruiting August-December.

Conservation status: The subspecies is known from four collections made prior to 1975 from Blue Mountain which is not a reserve. Blue Mountain is surrounded by rural and urban development. Recent urban expansion will no doubt increase the frequency and level of disturbance on Blue Mountain, e.g. through fire, weeds and general habitat destruction. Urgent surveys are required to determine its exact status and extent on Blue Mountain and if the taxon is found on other nearby granite hills. A conservation code of 2E is appropriate.

Etymology: The epithet is derived from the Latin, *monti* (Mountain) and *azureus* (blue), and refers to the only known locality of this subspecies.

7c. *Boronia inflexa* subsp. ***grandiflora*** Duretto, *subsp. nov.*

A subspecie typica petalis grandioribus et a subspecie *torringtonensis* Duretto foliis minute pilosis differt.

Type: QUEENSLAND: DARLING DOWNS: On property of W. McDonagh, Lyra, *K.N. Shea S124*, 22.x.1962 (holotype BRI *AQ151006* [transparency MEL *2068529*]).

["*Boronia bipinnata*" *auct. non* Lindl.: T.D. Stanley and E.M. Ross, *Fl. South East Queensland* 1: 451 (1983), p.p.]

Shrub (height unknown). *Branchlets* not glandular tuberculate, pilose between leaf decurrencies, hairs to 0.5(–0.75) mm long. *Leaves* imparipinnate, 3(–7)-foliolate, entire leaf in outline (9–)15–25 mm long, (8–)17–35 mm wide, glabrous to sparsely and minutely pilose; petiole 4–10 mm long; rachis segments 4–9 mm long; terminal leaflets 4–15 mm long, 0.75–1.25 mm wide; lateral leaflets similar to terminal leaflets. *Inflorescence* axillary, 3-flowered, smaller or c. as long as leaves; peduncles 2–7 mm long; prophylls 1–3 mm long, ciliate towards apex; anthopodia 1.5–3 mm long. *Sepals* deltate, 2–3 mm long, 1.25–1.5 mm wide, glabrescent along margin or towards apex, tip acuminate due to involute margins. *Petals* pale pink and tinged with white, 6.5–7.5 mm long, minutely ciliate. *Anther apicula* with a few simple hairs. *Style* pilose. *Cocci* and *seed* not seen. (Figs 2 N-O).

Additional specimen examined: **QUEENSLAND**: DARLING DOWNS: Near Amiens, SE Qld, *J. Harslett s.n.*, 30.ix.1973 (NE *2638* [transparencies BRI, MEL *2068530*]).

Notes: *Boronia inflexa* subsp. *grandiflora* is distinguished from the type subspecies by the large petals (6.5–7.5 mm long; cf. 2.5–3.5 mm long) and from subsp. *torringtonensis* by the minutely pilose leaflets (cf. glabrous or glabrescent). The two known collections of subsp. *grandiflora* were made on the western edge of the known distribution of subsp. *inflexa* and it would be of interest to conduct surveys around Lyra and Amiens to determine whether the two subspecies are distinct or grade into each other. Weston and Duretto (2002) refer to a large-flowered form of *B. bipinnata* from the granite belt of southern Queensland, which is referable to this subspecies.

Distribution and ecology: *Boronia inflexa* subsp. *grandiflora* is known from near Amiens and Lyra (SE Qld) (Fig. 3), where it is found on granite derived soils. Flowering material has been collected in September and October.

Conservation status: The subspecies has been collected in 1962 and 1973 and the localities given were vague. A number of granite outcrops around Amiens were surveyed for this taxon by the author (Oct. 2001) to no avail. Surveys are urgently required to ascertain its geographic range, population size, taxonomic status and conservation status. A conservation code of 2K is appropriate.

Etymology: The epithet is derived from the Latin, *grandis* (large) and *flora* (flower), and alludes to the large flowers of this subspecies which are the largest in *B. inflexa* and twice that of the typical subspecies which is geographically closest.

7d. *Boronia inflexa* subsp. ***torringtonensis*** Duretto, *subsp. nov.*

A subspecie typica petalis grandioribus et a subspecie *grandiflora* Duretto foliis glabris vel glabratis differt.

Type: NEW SOUTH WALES: NORTHERN TABLELANDS: Bismuth Falls, SW of Torrington, 29°17'S 151°45'E, *J.B. Williams s.n.*, 5.x.1990 (holotype NSW *414748*; isotypes BRI *AQ53669*, MEL *2040351*). (Figs 2 P-R).

["*Boronia bipinnata*" *auct. non* Lindl.: P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 231 (1991), p.p.; P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 270 (2002), p.p.]

Illustration: P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 270 (2002), as *B. bipinnata* (right hand specimen).

Shrub to 1.5 m tall. *Branchlets* not glandular tuberculate, hispidulous between leaf decurrencies, hairs 0.25(–0.5) mm long. *Leaves* imparipinnate, 3(–5)-foliolate, entire leaf in outline (9–)16–25 mm long, (8–)17–30 mm wide, glabrous or glabrescent; petiole 4–9 mm long; rachis segments 4–5 mm long; terminal leaflets (4–)10–16 mm long, (0.75–)1–1.25 mm wide; lateral leaflets similar to terminal leaflets. *Inflorescence* 3-flowered, shorter than leaves; peduncles (2.5–)4–5 mm long; prophylls 1–2.5 mm long, glabrous; anthopodia 2–3 mm long. *Sepals* pink, deltate, 1.5–3 mm long, 1–1.5 mm wide, glabrous, tip acuminate due to involute margins. *Petals* white, 4.5–6 mm long, glabrous or minutely ciliate. *Anther apicula* with a few simple hairs. *Style* glabrescent to pilose. *Cocci* c. 3.5 mm long, c. 2 mm wide, glabrous. *Seed* c. 3 mm long, c. 1.5 mm wide.

Additional specimens examined: **NEW SOUTH WALES**: NORTHERN TABLELANDS: Torrington District, 29°19'S 151°42'E, *S. Elliott s.n.*, ix.1991 (NE *57872*); Torrington, *J.L. Boorman s.n.*, 1.i.1916 (BRI *AQ150097*; NSW *373849*); Bismuth via Deepwater, *A. McMutt*, vii.1913 (NSW *373847*); Bismuth Falls, SW of Torrington, 29°17'S 151°45'E, *J.B. Williams 90221*, 5.ix.1990 (MEL, NSW, UNE *n.v.*).

Notes: *Boronia inflexa* subsp. *torringtonensis* is distinguishable from the type subspecies by the larger petals (4.5–6 mm long; cf. 2.5–3.5 mm long) and from *B. inflexa* subsp. *grandiflora* by the glabrous or glabrescent leaves (cf. minutely pilose). Weston and Duretto (2002) refer to this subspecies as the large-flowered form of *B. bipinnata* from Torrington.

Distribution and ecology: The subspecies is restricted to the Torrington area (Fig. 3) where it is found in dry sclerophyll forest on granite derived soils. Flowering material has been collected in September, October and January and fruiting material in September.

Conservation status: The subspecies is known from few collections, is not found in reserves, and urgent surveys are required to determine its exact status. A conservation coding of 2E is appropriate.

Etymology: The epithet refers to the area were this subspecies appears to be confined: the Torrington area is noted for a number of endemic taxa and widely disjunct populations.

8. *Boronia nana* Hook.f., *Icon. Pl.* 3: t. 270 (1840); *B. hyssopifolia* var. *ß* Hook.f., *Flora Tasman.* 1: 66 (1855); *B. polygalifolia* var. *trifoliolata* Benth., *Fl. Austral.* 1: 321 (1863). *Type citation*: "On the top of Rocky Cape, Van Diemen's Land. Ronald Gunn (n. 894)." *Type*: Rocky Cape, V.D.Land [Tasmania], *R. Gunn 894*, 29.xii.1837 (lectotype, here designated, K [ex Hooker's herb.] *n.v.* [cibachrome MEL *2041263*, photograph AD *99803340*]; isolectotypes HO *4586*, K [ex LINN] *n.v.* [cibachrome MEL *2041264*], NSW *23861* [this specimen does not have Gunn as the collector but as the labels are written as thus '894/29.xii.1837 Rocky Cape' and 894 Boronia Rocky Cape' it can be assumed that they are collections made by Gunn]); Tasmania, *R.G. Gunn s.n.* (possible isolectotype TCD [ex herb. Hook., upper three specimens labeled A1; transparencies MEL, *2068531*, HO]).

["*Boronia polygalifolia*" *auct. non* Sm.: F. Mueller, *Pl. Victoria* 1: 114 (1860-1862), p.p.; F. Mueller, *Nat. pl. Victoria* 69 (1879), p.p.; F. Mueller, *Key Vict. pl.* 2: 9 (1885), p.p.; F. Mueller, *Key Vict. pl.* 1: 145 (1887-1888), p.p.; R. Tate, *Handb. fl. extratrop. S. Australia*, 23 & 209 (1890); FNCV, *A census of the plants of Victoria* 39 (1923, 1928); J.M. Black, *Fl. S. Austral.* 338 (1924); A.J. Ewart, *Fl. Victoria* 700 (1931); J.M. Black, *Fl. S. Austral.* 2nd edn, 491 (1948).]

Illustrations: J.M. Black, *Fl. S. Austral.* 2: 336, Fig. 154D (1924), as *B. polygalifolia*, stamen; J.M. Black, *Fl. S. Austral.* 2nd edn, 2: 491, Fig. 664D (1948), as *B. polygalifolia*, stamen; J. Garnet, *The Wildflowers of Wilson's Promontory*, Fig. 537 (1971); I.R. McCann, *The Grampians in Flower*, 99 (1994), photograph.

Weakly erect or spreading *sub-shrub* to 0.5(–1) m long, glabrous to pubescent. *Branchlets* not obviously glandular, pubescent between leaf decurrencies, becoming glabrous with age, hairs to 0.3 mm long. *Leaves* simple or 3(–5)-foliolate, very rarely bipinnate (var. *nana*); petiole 0.5–5 mm long; leaflets and simple leaves 2–25 mm long, 0.5–4 mm wide, narrow to broad linear to elliptic, ovate or obovate, flat, slightly discolorous, dorsiventral to nearly isobilateral, palisade and spongy mesophyll sometimes poorly differentiated, dense region of large undifferentiated cells between the spongy and palisade mesophyll layers (vars *hyssopifolia*, *nana*), margins entire, tip acute to mucronate. *Inflorescence* 1–3(–7)-flowered; peduncles 1–7 mm; prophylls and metaxyphylls 0.5–2 mm long; anthopodia 2–16 mm long. *Sepals* deltate to narrow-deltate or ovate to broad ovate, 1–3.5 mm long, 0.5–1.5 mm wide, not obviously glandular. *Petals* white to pink, 2.5–6 mm long, 1.2–3 mm wide, not obviously glandular, persistent. *Staminal filaments* flat, pilose on margins, glandular tuberculate towards apex, if only slightly; anther loculi glabrous, appendage flat, glabrous or with 1–5 hairs. *Ovary* glabrous; style pilose, sometimes only at base; stigma entire, minute, as wide or slightly wider than style. *Cocci* glabrous or glabrescent, 3–4.5 mm long. *Seeds* black to dark brown, dull, 2–2.5 mm long, 1–1.5 mm wide, irregularly rugulose, tuberculate, wax crystals between tubercula. **Dwarf Boronia, Small Boronia**.

Notes: Mueller (1860-1862, 1879, 1882, 1885, 1887-1888, 1889), Bentham (1863), Tate (1890), Rodway (1903), FNCV (1923, 1928), Ewart (1931) and Black (1924, 1948) included *B. nana* in their concepts of *B. polygalifolia* (see synonymies below and under *B. polygalifolia*) though Ewart also recognised *B. hispida* (=*B. nana* var. *pubescens*). The varieties of *B. nana* have been recognised in floras and handbooks of Victoria (Willis 1973; Duretto 1999c), Tasmania (Curtis & Morris 1975) and New South Wales (Beadle *et al.* 1972, 1982; Weston & Porteners 1991; Caroline & Tindell 1993; Weston & Duretto 2002), and South Australian censuses (Jessop 1983, 1984). In the *Flora of South Australia* Armstrong and Telford (1986) considered that the varieties of *B. nana* to grade into each other and so "impractical". Varieties of *B. nana* were not accepted in later censuses of South Australia (Jessop 1989, 1993) or listed in the Tasmanian census (Buchanan *et al.* 1989; Buchanan 1995). Willis (1957, 1973) indicated that var. *nana* and var. *hyssopifolia* are co-extensive almost throughout the range in Victoria which is not totally true. Though there is some grading between varieties and some populations that can be difficult to classify (see discussions under individual varieties) the classification holds true in most areas and so is of taxonomic value and will be retained here.

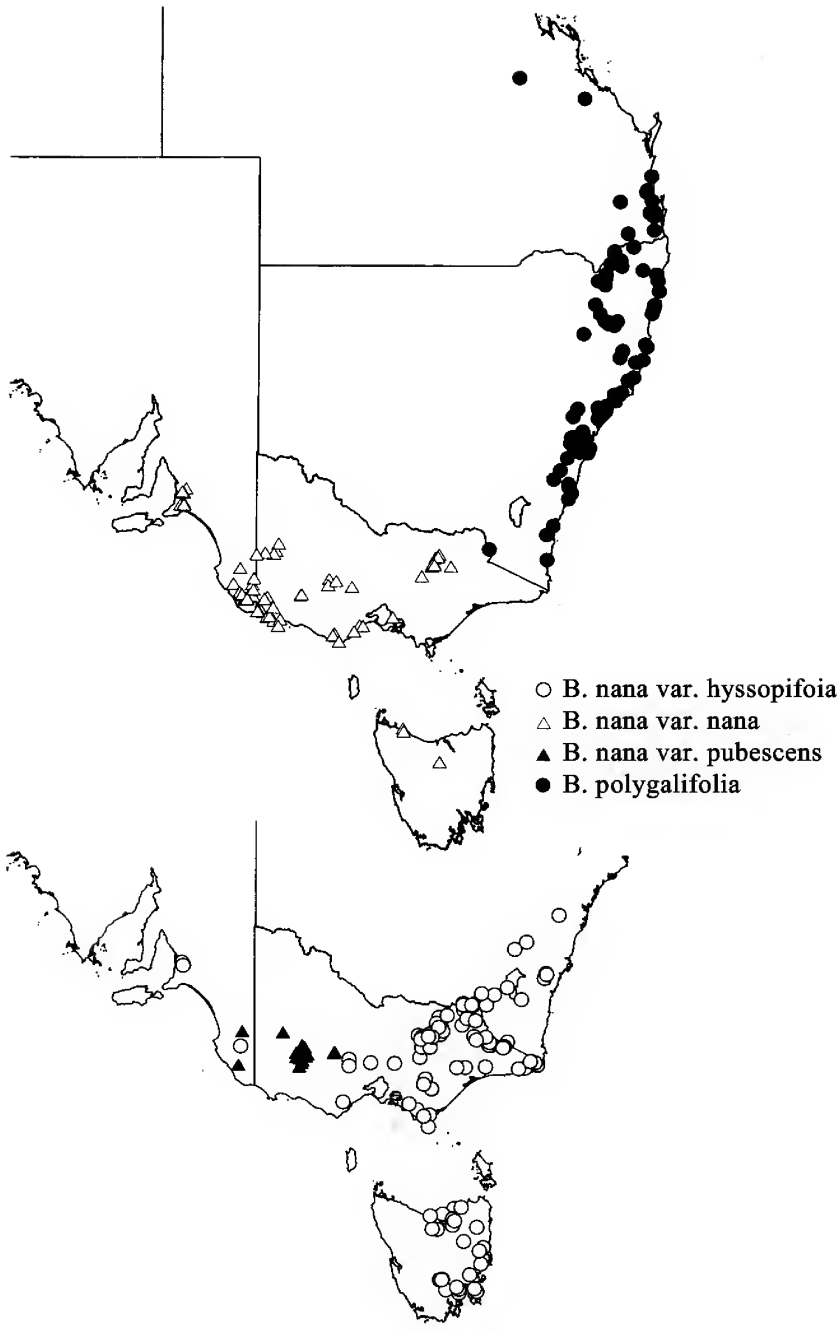

Figure 4. Distribution of *B. nana* var. *hyssopifolia*, *B. nana* var. *nana*, *B. nana* var. *pubescens*, *B. polygalifolia*.

Horticultural notes on *B. nana* are given by Elliot and Jones (1982).

Distribution and ecology: *Boronia nana* is a widespread species found in southern New South Wales, Victoria, south-eastern South Australia and Tasmania (Fig. 4). The species is found in heath, open woodland and forest usually on sandy or rocky substrates. Flowering mainly September-March; fruiting mainly November-March.

Boronia nana was found to be self compatible by Weston *et al.* (1984).

Etymology: The specific epithet is derived from the Latin, *nanus* (dwarf), presumably referring to the small stature of the species.

Key to the varieties of B. nana.

1. Leaves simple ..... **8c.** var. ***hyssopifolia***
1: Leaves 3(–5)-foliolate 2
2. Leaves [usually], sepals, petals glabrous or glabrescent ..... **8a.** var. ***nana***
2: Whole plant indumented ..... **8b.** var. ***pubescens***

8a. *Boronia nana* Hook. var. ***nana***

Illustrations: J.D. Hooker, *Icon. Pl.* 3, t. 270 (1840), as *B. nana*; R. Melville and V.S. Summerville, *Kew Bull.* 9: 462, Figs 1.5–1.8 (1954), of type at KEW; G.R.M. Dashorst and J.P. Jessop, *Plants of the Adelaide Plains and Hills*, 96, pt 41, 4-4a (1990); M.F. Duretto, *Fl. Victoria* 4: 160, Fig. 28f (1999).

Branches and leaves glabrous or glabrescent, hairs usually straight, sometimes arched. *Leaves* imparipinnate, very rarely bipinnate, 3(–5)-foliolate, sometimes proximal leaves simple, dorsiventral, spongy mesophyll tightly packed, dense region of undifferentiated cells between palisade and spongy mesophyll layers. *Perianth* glabrous or glabrescent abaxially.

Selected specimens examined: **SOUTH AUSTRALIA**: SOUTH EASTERN: Lirabenda Field Naturalists Society Reserve, 35°03'S 138°44'E, *A.G. Spooner 11297*, 14.xi.1988 (AD); Cox's Scrub Conservation Park, *A.G. Spooner 5589*, 10.xi.1977 (AD); Big Heath NP, top NW corner, 37°06'S 140°34'E, *C.R. Alcock 3008*, 5.xi.1969 (AD, MEL); Comaum Forest Reserve, 37°12'S 140°53'E, *J.Z. Weber 7631*, 17.x.1982 (AD); Marshes Swamp, 37°36'S 140°31'E, *N.N. Donner 8497*, 1.xi.1981 (AD, CANB); Penola Forest Reserve, *A.A. Munir 5448*, 5.xi.1981 (AD, HO); **VICTORIA**: WANNON: On scarp of the Glenelg River Gorge, near Hutcheson's cave, c. 5 miles [c. 8 km] NW of Nelson, *R. Melville 1566, C. Beauglehole and P. Finck*, 12.x.1952 (AD, MEL, NSW); SE of Portland Alcoa smelter site, 1.3 km NW of Point Danger, 38°23'S 141°38'E, *M.D. Crisp 6812*, 17.xi.1980 (CANB, MEL); LOWAN MALLEE: Little Desert NP, Grid Ref. SJ 54–3 Horsham-477488, *C. Brownsea s.n.*, 18.iii.1981 (MEL); MIDLANDS: Ben Major SF, c. 10 miles [c. 16 km] N of Beaufort, *T.B. Muir 3614*, 12.xi.1964 (MEL); Piccaninny Hill, near Dunkeld, 37°38'S 142°20'E, c. 900 m from Torquay-Anglesea Rd on the road to Point Addis, 38°22'S 144°14'S, *M.F. Duretto 1259 and O.A. Duretto*, 23.11.1997 (AD, CANB, HO, MEL); EASTERN HIGHLANDS: Paradise Falls, on tributary of Stony Ck (into King River), near Cheshunt, 36°52'S 146°27'E, *T.J. Entwisle 1694 and S. Bodsworth*, 8.x.1990 (MEL); **TASMANIA**: NORTH WEST: Sisters Hill, Table Cape 7454705, 40°55'S 145°31'E, *P. Collier 108*, 30.xi.1984 (HO); Meander River, south from Deloraine, *J. Somerville s.n.*, 1.i.1959 (HO 4583).

Notes: Willis (1957, 1973) states that *B. nana* var. *nana* and var. *hyssopifolia* are co-extensive almost throughout the range in Victoria. Certainly in the Anglesea area there appear to be distinct populations of both varieties (pers. obs.). Both varieties are also found in north-east Victoria and the southern Lofty Ranges of South Australia. Though most populations appear to have either trifoliolate or simple-leaved plants some collections of var. *nana*, e.g. from near Deloraine (e.g. *Somerville s.n.*, HO *4583*), have both trifoliolate and simple leaves. Population studies are required to determine the taxonomic value of these observations. Unfortunately population studies of *B. nana* may prove difficult as the populations are usually small and appear to be prone to severe herbivory. *Boronia nana* var. *nana* is also partially sympatric with var. *pubescens* (see discussion under that variety).

Specimens from near Chestnut (e.g. *Entwisle 1694*) and Anglesea (e.g. *Duretto 1259*) have some 5–foliolate leaves and some specimens appear to have had bipinnate leaves as there are what appear to be leaflet scars on the lower leaflets. Bipinnate leaves are common elsewhere in *B.* section *Cyanothamnus*, especially on the east coast.

Distribution and ecology: *Boronia nana* var. *nana* is common in south-eastern South Australia and south-western and central Victoria (Fig. 4). In Tasmania the variety is restricted to the Rocky Cape (type locality), Deloraine and Table Cape areas in the north-east. The taxon is found in heath and open woodland usually on sandy or rocky substrates. Flowering (January-August)-September-February; fruiting November-March.

Conservation status: In Victoria and South Australia the variety appears to be secure. In Tasmania the variety is vulnerable or endangered as it is confined to few areas in the north-east where it appears to be is rare (pers. obs.)

8b. *Boronia nana* var. ***pubescens*** (Benth.) J.H.Willis, *Vict. Nat.* 73: 192 (1957); *B. polygalifolia* var. (?) *pubescens* Benth., *Fl. Austral.* 1: 321 (1863); *B. hispida* Cheel, *J. & Proc. Royal Soc. NSW* 61: 403 (1928). *Type citation*: "In the Grampians, Wilhelmi, Robertson." *Type*: Mt Sturgeon [Grampians], Victoria, Robertson (lectotype, here designated, K *n.v.* [cibachrome MEL *2041257*, photograph AD *99548096f*]).

Boronia pubescens Bartl. in Lehmann, *Pl. Preiss.* 2: 227 (1848). *Type citation*: "In regionibus interioribus Australiae meridionali-occidentalis m. Oct. 1840. Herb. Preiss. No. 2643." *Type*: *Preiss s.n.* (lectotype, here designated, LD *95036.0998* [transparencies AD, HO, MEL *2068532*]). [Note: Though this Preiss collection of *B. nana* var. *pubescens* (the 3-5-foliolate leaves and perianth are pilose) does not have a number or locality, it is the only collection of the taxon made by Preiss seen from LD, and so is designated the lectotype. NOTE: locality information incorrect: the subspecies is not found in Western Australia.]

Illustrations: M.F. Duretto, *Fl. Victoria* 4: 160, Fig. 28g (1999); M.G. Corrick and B.A. Fuhrer, *Wildflowers of Victoria* 207 (2000), photograph.

Branches and leaves sparsely to densely pubescent, hairs usually arched. *Leaves* 3(–5)-foliolate. *Perianth* sparsely to densely pubescent abaxially, mainly along midrib. n=18 (Stace & Armstrong 1992; Stace *et al.* 1993, as *B. nana*).

Selected specimens examined: **SOUTH AUSTRALIA**: SOUTH EASTERN: Rubbish Dump Scrub, Millicent Golfcourse Rd, 37°33'S 140°27'E, *Comalley 76*, 19.vi.1984 (AD); c. 34 km N of Naracoorte along the road to Bordertown, *Hj. Eichler 17677*, 16.xi.1963 (AD); **VICTORIA**: GRAMPIANS: Mt Rosea Ck, near Calectasia Falls, *A.C. Beauglehole 30375A*, 27.i.1969 (MEL); near Mirrantwa Gap, *M.E. Phillips 479*, 3.xi.1971 (CANB, MEL); Victoria Range Rd, c. 7 km NNW of Mt Thackery, 37°15'S 142°18'E, *A.M. Lyne 536 and B. Hadlow*, 7.xi.1991 (CANB); road to Mt William car park, 37°18'S 142°36'E, *P.G. Abell 461 and C. Herscovitch*, 14.xii.1986 (NSW); c. 0.1 km SW along stockyard track from the point where the foot track to Major Mitchell Plateau begins, 37°21'S 142°33'E, *D.E. Albrecht 1282*, 8.xi.1984 (MEL); Grampians, *C. Walter s.n.*, xi. 1900 (NSW *385369*, MEL *251082*); MIDLANDS: Ben Major Forest reserve, *R.V. Smith 76/73*, 15.xii.1976 (MEL).

Notes: Bentham (1863) thought that *B. pubescens* was a form of his concept of *B. lanuginosa* Endl. (= *B. stricta* Bartl., a Western Australian species, see Wilson 1975) though he had not seen the type material collected by Preiss, and so, did not base his *B. polygalifolia* var. (?) *pubescens* on it. Cheel (1928) considered *B. hispida* to be most closely related to *B. robusta*. *Boronia robusta* is apparently a manuscript name presumably synonymous with *B. polygalifolia* var. *robusta* Benth. which Cheel later described as *B. rigens* (see Cheel 1929; Neish & Duretto 2000).

Mueller at MEL appeared to have had a manuscript name for *B. nana* var. *pubescens*, *viz. B. tetrathecoides* var. *pubescens*, which he used on many specimens (e.g. Grampians, *F. Mueller* (MEL [many sheets], K *n.v.* [cibachromes AD, MEL *2041256*, photograph AD

99548095], TCD). As far as can be found this name does not appear to have been published. This name is of note as another of Mueller's manuscript names, namely *B. tetrathecoides* var. *simplicifolia* (see *B. nana* var. *hyssopifolia*) was listed by J.D. Hooker (1855) (see also discussion in Melville and Summerhayes 1954). Normally old manuscript names, and there are many in *Boronia*, do not require discussion but as the nomenclatural history of both *B. nana*, especially var. *hyssopifolia*, and *B. polygalifolia* is complex and, at times, confusing, it is worthwhile drawing attention to these names here.

Boronia nana var. *pubescens* is partially sympatric with var. *nana* and these varieties may grade in Victoria. The two known South Australian collections are of single plants in areas largely dominated by the type variety. These collections require confirmation and population studies would be useful in these areas. Interestingly, pubescent and glabrous forms of *B. coerulescens* are also found in the Grampians and south-eastern South Australia.

Distribution and ecology: The variety is widespread in the Grampians National Park, Victoria, but is also found to the east in Ben Major forest reserve, and in south-east South Australia north of Naracoorte and near Milicent (Fig. 4). Plants of *B. nana* var. *nana* from the Otway Plain referred to this variety by Willis (1973) are glabrescent and though slightly hairier than typical plants are placed with the type variety (see Duretto 1999c). The taxon is found in open forest, woodland and heath on rocky substrates. Flowering (July-)October-March; fruiting November-February.

Conservation status: In Victoria the variety appears secure and if the collections from South Australia are confirmed then the status of these populations need to be determined.

Etymology: The varietal epithet refers to the pubescent leaves.

8c. *Boronia nana* var. ***hyssopifolia*** Melville, *Kew Bull.* 9: 463, Fig. 1, 1-4 (1954). *Type*: Victoria, Little River, Wulgulmerang, Gippsland, *R. Melville 3015*, 20.i.1953 (holotype K *n.v.* [photograph AD *99548092*]; isotypes AD *96018054*, CANB *79520*, L *96055070* [viewed at http://nhncml.leidenuniv.nl, vi.2001], MEL *243037*, NSW *385528*, PERTH *1610228*).

[*Boronia hyssopifolia* Sieb. ex Hook., *J. Bot. (Hooker)* 1: 255 (1834), p.p., *nom inval. non* Sieb., no description given. *Specimens cited*: "*Sieb. Herb. Nov. Holl. n.* 296. Mr. Lawrence, (1831.)". *Note*: Sieber 296 = *B. polygalifolia* which is not found in Tasmania and W.J. Hooker *(l.c.)* was discussing the Tasmanian flora in this manuscript. Equated with *B. nana* var. *hyssopifolia* by Melville and Summerhayes, *Kew Bull.* 9: 463 (1954).]

[*Boronia hyssopifolia* Sieb. ex Hook.f., *J. Bot. (Hooker)* 2: 418 (1840), p.p., *nomen nudum*, description indecisive. *Specimens cited*: "Sieb. (n. 296.), Mr. Lawrence, (1831.) Mr Gunn (n. 458, 1832)". *Note*: Sieber 296 = *B. polygalifolia* which is not found in Tasmania and J.D. Hooker *(l.c.)* was discussing the Tasmanian flora in this manuscript. Equated with *B. nana* var. *hyssopifolia* by Melville and Summerhayes, *Kew Bull.* 9: 464 (1954).]

[*Boronia tetrathecoides* Pers. ex Hook., *Comp. Bot. Mag.* 1: 277 (1836). *Type citation*: "Mr. Gunn (n. 458)". *nom illeg.,* non DC., *B. hyssopifolia* Sieb. ex Hook. cited in synonymy. Equated with *B. nana* var. *hyssopifolia* by Melville and Summerhayes (*l.c.*).]

[*Boronia tetrathecoides* var. *simplicifolia* F.Muell. ex Hook.f., *Fl. Tasman.* 1: 67 (1855) *nom. invalid*, provisional name only.]

["*Boronia polygalifolia*" *auct. non* Sm.: G. Bentham, *Fl. Austral.* 1: 321 (1863), p.p.; L. Rodway, *Tasman. Fl.*, 22 (1903)]

[*Boronia oppositifolia* (Pers.) Cheel, *J. & Proc. Roy. Soc. New South Wales* 61: 408 (1928), p.p.; *B. polygalifolia* Sm. var. *oppositifolia* (Pers.) J.M. Black, *Fl. S. Austral.* 2nd edn: 2, 493 (1948), p.p.; see discussion under *B. polygalifolia*]

Illustrations: R. Melville and V.S. Summerville, *Kew Bull.* 9: 463, Fig. 1, 1-4 (1954), of holotype at K; G.R. Cochrane, B.A. Fuhrer, E.D. Rotherham and J.H. Willis, *Flowers and Plants of Victoria and Tasmania* 23, t. 38 (1980, 3rd edn), photograph, as *B. nana*; A. Fairley and P. Moore, *Native Plants of the Sydney District*, 234, pl. 810 (1989), photograph, as *B. nana*; P.H. Weston and M.F Porteners, *Fl. New South Wales* 2: 230 (1991); M.F. Duretto, *Fl. Victoria* 4: 160, Fig. 28f (1999); P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 268 (2002).

Branches sparsely to densely hispidulous between leaf decurrencies, otherwise glabrous or glabrescent. *Leaves* simple, glabrous, glabrescent or sparsely hispidulous, dorsiventral or nearly isobilateral, palisade and spongy mesophyll sometimes poorly differentiated, dense region of large undifferentiated cells between the spongy and palisade mesophyll layers. *Perianth* glabrous abaxially.

Selected specimens examined: **SOUTH AUSTRALIA**: SOUTH EASTERN: Between Carey's Gully and Bridgewater, c. 20 km ESE of Adelaide, *J.B. Cleland s.n.*, 11.xi.1944 (AD *96306059*); Stirling West, Mount Lofty Range, *E.H. Isling s.n.*, 11.xii.1957 (AD *96149408*, CANB); **NEW SOUTH WALES**: SOUTH WESTERN SLOPES: Rosewood via Wagga Wagga, *McEchern s.n.*, vii.1896 (NSW *385511*); 30 km from Yass toward Bevendale, between Blakney Ck and Bloomfield Homestead, 34°38'S 149°03'E, *E.M. Canning 6885*, 6.i.1994 (CANB); SOUTHERN TABLELANDS: Wog Wog Ck, c. 20 km SSW of Nerriga, 35°17'S 150°02'E, *I.R. Telford 10521*, 9.xii.1987 (CANB); **AUSTRALIAN CAPITAL TERRITORY**: Cribbs Ck, upper Cotter Valley, Namadgi NP, 35°37'S 148°49'E, *P. Gilmour 6404*, 1.i.1988 (CANB); **VICTORIA**: OTWAY PLAIN: High Plain, *Andas and St. John s.n.*, 11.xi.1908 (MEL *682087*); Gerangamete area, 19 km SSE of Colac P.O., K26, *A.C. Beauglehole 63869*, 22.iv.1979 (MEL); MIDLANDS: Creswick, Eastern Hill, *J.H. Willis s.n.*, 1.i.1946 (MEL); Long Street, between the junction of Spencer and Bennett Streets, Canadian, near Ballarat, 37°36'S 143°54'E, J36, *B. Conn 1384*, 5.xi.1983 (MEL); Burrowa-Pine Mountain NP, c. 10 km S from Walwa along Walwa to Cudgewa North Rd, 36°04'S 147°45'E, *F.E. Davis 676, M.J. Winsbury and S. Donaldson*, 14.xi.1988 (CANB, MEL); EASTERN HIGHLANDS: 35 km S from Benalla in Mt Samaria State Park near T-junction on Samaria Rd 1 km W of Park entrance, R40, 36°49'S 146°03'E, *A. Pierce 542*, 12.xi.1986 (MEL); Mt Buffalo NP, SE side on road from Dandongadale, 36°48'S 146°44'E, *T.J. Entwisle 1751 and S. Bodsworth*, 10.x.1990 (MEL); EAST GIPPSLAND: 4 km SW of Buckwong Ck on Mt Hope Track, 36°45'S 147°56'E, *D. Parkes EG150*, 18.i.1985 (MEL); 12 km N of Bonang, 3.5 km W along Dellicknora Rd from Bonang Hwy, 37°06'S 148°44'E, *R.O. Makinson 1003 and P. Carmen*, 7.xii.1991 (CANB, MEL); Mallacoota Inlet NP, SE of Gypsy Point turn-off, c. 7 miles [c. 11.2 km] NW of Mallacoota post office, *A.C. Beauglehole 31689*, 14.xi.1969 (MEL); WILSONS PROMONTORY: Wilsons Promontory NP, 38°53'S 146°25'E, *A.C. Beauglehole 75182*, 7.xi.1983 (MEL); **TASMANIA**: MIDLANDS: Prosser R. Gorge, 4 miles [c. 6.4 km] from Buckland, *R. Melville 2490, J.H. Willis and H.N. Barber*, 18.xii.1952 (MEL, NSW); Main Rd, Latrobe, opposite old aerodrome site, 41°12'S 146°26'E, *J. Somerville s.n.*, 8.xi.1948 (HO *4604*); NORTH EAST: Barbers Bottom, 41°19'S 147°11'E, *A.M. Buchanan 678*, 11.xii.1981 (HO); SOUTH EASTERN: Little Swanport, near head of Block and Stable Ck, 42°01'S 147°54'E, *A.M. Buchanan 4589*, 4.xii.1984 (HO); Westerway, 42°41'S 146°47'E, *W.M. Curtis s.n.*, 11.xii.1952 (HO *4588*).

Notes: Melville and Summerhayes (1954) unravelled nomenclatural problems of both this taxon and *B. polygalifolia.* For a detailed discussion see that publication. *Boronia nana* var. *nana* and var. *hyssopifolia* are co-extensive in parts of their ranges in Victoria (see notes under var. *nana*).

Distribution and ecology: *Boronia nana* var. *hyssopifolia* is found on ranges and upper slopes south from Mt Wilson (NSW) to central and north-eastern Victoria including the highlands, south eastern South Australia, and eastern and northern Tasmania (Fig. 4). The variety is found in heath, woodland and forest on a variety of substrates. The known distribution, ecology and conservation status of this species in the Central Tableland region of New South Wales are discussed by Benson and McDougall (2001).

Flowering October-January; fruiting November-January(-April).

Conservation status: The taxon is historically widespread but its current status is unknown. In the south-east forests of New South Wales the taxon is considered to be

regionally uncommon where it is known from two localities (Keith & Ashby 1992). Field work is required in all states to determine if there are secure populations. All populations seen by the author were small and often severely effected by herbivory.

Etymology: The subspecific epithet is apparently derived from the leaves of this taxon being similar to that of Hyssop (*Hyssopus* Linn., Lamiaceae).

9. *Boronia polygalifolia* Sm., *Tracts nat. hist.* 297, t. 7 (1798). *Type citation*: type not cited. [Though specimens were not cited with the description Smith (l.c., p. 290), in the preamble of the paper, states 'Four species only of the genus in question have been hitherto been detected among dried specimens collected near Port-Jackson, by Mr. White'; later Smith (1807, p. 285) cites one specimen 'Gathered near Port Jackson, by Dr. White'.] *Type*: Port Jackson, New South Wales [c. 33°49'S 151°17'E, Central Coast], *Mr White s.n.*, 1795 (lectotype, here designated, LINN *684.9 n.v.* [transparency MEL *2041282*]; isolectotype LIV *n.v.* [photograph CANB]). [Note: Mr John White was Surgeon General to the Settlement of Port Jackson in 1788 (Cheel 1928).]

[*Tetratheca oppositifolia* Pers., *Syn. pl.* 1: 419 (1805); *B. tetrathecoides* DC., *Prodr.* 1: 722 (1824), *nom illeg.*, based on above; *B. oppositifolia* (Pers.) Cheel, *J. & Proc. Roy. Soc. New South Wales* 61: 408 (1928); *B. polygalifolia* var. *oppositifolia* (Pers.) J. Black, *Fl. S. Austral.* 2nd edn: Pt. 2, 493 (1948). *Type*: Herb. Tribauld, 1815 (holotype G-DC) see also Melville and Summerhayes, *Kew Bull.* 9: 46 (1954), and Thompson, *Telopea* 1: 214 (1976).]

[*Boronia hyssopifolia* Sieb., *Flora Beil.* 4: 137 (1825) *nomen nudum*, equated with *B. polygalifolia* by Sprengel (*Syst. Cur. Post. 148*, 1827) *fide* Melville and Summerhayes (*l.c.*).]

Illustrations: J.E. Smith (*l.c.*); A. Engler in A. Engler and K. Prantl (Eds), *Nat. Pflanzenfam.* 3(4), 135, Figs 75J, K (1896), fruit and seed; A. Engler in A. Engler and K. Prantl (Eds), *Nat. Pflanzenfam.* edn 2 19A: 251, Figs 107J, K (1931), fruit and seed; R. Melville and V.S. Summerville, *Kew Bull.* 9: 462, Figs 1.9-1.12 (1954); B.A. Lebler, *Queensland Agric. J.* 98: 199 (1972); B.A. Lebler, *Wildflowers of South East Queensland* 1: 28 (1977); K.A.W. Williams, *Native Plants Queensland* 1: 37 (1980); T.D. Stanley and E.M. Ross, *Fl. South East Queensland* 1: 451, Figs 69G1-3 (1983); A. Fairley and P. Moore, *Native Plants of the Sydney District*, 234, pl. 811 (1989), photograph; P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 230 (1991); P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 268 (2002).

Weakly erect or spreading, decumbent sub-*shrub* to 30 cm long, usually several wiry branches arising from a woody rootstock, glabrous apart from flowers. *Branchlets* terete to quadrangular, not obviously glandular, with two shallow grooves in between leaf decurrencies, moderate cork development. *Leaves* simple, sessile or with petiole to 1 mm long; lamina 8–30 mm long, 0.8–5 mm wide, narrow to broad linear to elliptic, rarely ovate or obovate, not obviously glandular or dotted with sunken glands, discolorous, abaxial surface paler, dorsiventral, spongy and palisade mesophyll layers not separated by a region of cells, flat or margins slightly recurved (in dry specimens revolute), margins entire or minutely serrate near tip, tip acute. Inflorescence 1(–3)-flowered; peduncles 0.5–5(–11) mm; prophylls minutely unifoliolate, 0.5-2 mm long, sometimes caducous; metaxyphylls absent; anthopodium 0.5–5(–9) mm long. *Sepals* ovate-deltoid, 1.5–2 mm long, 0.8–1.5 mm wide, not obviously glandular, glabrous, tip acute. *Petals* white or pink, 4.5–6.5 mm long, 2.5–3.5 mm wide, not obviously or slightly glandular, glabrous or sometimes minutely and sparsely ciliate, persistent with fruit. *Staminal filaments* with short stout hairs on margins, slightly glandular tuberculate towards apex or not; anthers glabrous, anther connective maroon, apiculum prominent, white. *Gynoecium* glabrous; stigma entire, minute, not or slightly wider than style. *Cocci* 3.5–4 mm long, 1.5–2 mm wide, glabrous. *Seed* black to dark brown, dull, 1.5-2 mm long, 1–1.5 mm wide, rugulose,

often in large thick ridges or isolated protuberances, often with wax between tubercula. n=18 (Smith-White 1954; Stace *et al.* 1993). **Milkwort-leaved Boronia**.

Representative specimens (c. 100 examined): *Sieber Fl. Novae Holl. No. 296* (K *n.v.* [cibachrome MEL *2041261*], MEL *258138*); **QUEENSLAND**: PORT CURTIS: Kroombit Tops, approx. 65 km SSW of Gladstone, *W.J.F. McDonald 1015,* 2.vii.1975 (BRI); LEICHHARDT: Blackdown Tableland NP, via Dingo, *S.G. Pearson s.n.,* 15.ii.1981 (BRI *AQ275112*); MORETON: Mt Emu, Havana Rd, c. 2.5 km N of Mt Coolum, 26°31'S 153°05'E, *P. Beesley 908 and P. Ollerenshaw*, 9.xii.1986 (BRI); Mt Tunbubudla, W of Beerburrum, 26°58'S 152°55'E, *A.R. Bean 6044*, 17.v.1993 (BRI); DARLING DOWNS: Hellhole Gorge, NE of Yangan, 28°07'S 152°22'E, *A.R. Bean 10917*, 5.x.1996 (AD *n.v.*, BRI, MEL, NSW *n.v.*); Jolly's Falls, about 8 km N of Stanthorpe, *K. Williams s.n.*, 17.x.1971 (BRI *AQ128863*); **NEW SOUTH WALES**: NORTHERN TABLELANDS: Middle Rd, South Boonoo Boonoo NP, 28°51'S 152°09'E, *C.E. Nano 5*, 6.ii.1994 (NE); 9.6 km from Torrington on road to Silent Grove, *J. Armstrong 653,* 26.xi.1973 (NSW); NORTH COAST: Southern Headland of Sandon River, *K. Grieves s.n.*, 31.viii.1969 (NSW *384990*); Lake Cathie, c. 10 miles [c. 16 km] NE of Kendall, *E.F. Constable 4797*, 15.v.1964 (NSW); 13 km SE of Hillgrove on Long Point Rd, 30°38'S 151°57'E, *J.B. Williamson 72-524,* 26.x.1972 (NE); CENTRAL COAST: 5 miles [c. 8 km] SE of Cessnock, *R. Story 6646*, 3.ix.1959 (CANB); 2 miles [c. 3.2 km] S of Howes Valley Post Office, *E.F. Constable 4214*, 23.iv.1963 (NSW); Duck R., Auburne, 33°52'S 151°01'E, *R. Coveny 7566, D. Benson and H. Bryant*, 25.iii.1976 (NSW); Picton Lakes, 5 miles [c. 8 km] W of Picton, *I. Keats and R. Coveny 3449,* 16.xii.1970 (NSW); CENTRAL TABLELAND: Barber's Ck [34°42'S 150°06'E], *H.J. Rumsy s.n.*, xi.1898 (NSW *385243*); SOUTH COAST: Swan Lake, Cudmirrah, 20 miles [c. 32 km] south of Nowra, *E.F. Constable 7365,* 14.iv.1967 (NSW); Vacant Crown Land W of Kalaru-Merimbula RD, 36°45'S 149°55'E, *M. Parris 9893 and N. Fisher*, 8.ii.1992 (CANB); SOUTHERN TABLELANDS: 8 miles [c. 12.2 km] c. S of Geehi (c. W of Mt Kosciusko) [36°29'S 148°09'E], *N.C. Ford s.n.*, 9.i.1959 (NSW *385244*).

Notes: Melville and Summerhayes (1954) unravelled some of the complexity of the nomenclature associated with *B. polygalifolia*, which they called 'A confused Boronia' and *Tetratheca oppositifolia*. The application of the latter name has caused some confusion (see also *B. nana* var. *hyssopifolia*; Thompson 1976).

Boronia polygalifolia is a widespread species readily distinguished from *B. nana* by the glabrous stems and discolorous leaves. The distributions of the two species possibly overlap in the southern end of the range of *B. polygalifolia*.

Mueller (1860-1862) adopted a broad concept for *B. polygalifolia* concluding that it 'was one of the most variable species of the vegetable kingdom.' In *B. polygalifolia* he included *B. tetrathecoides* (= *B. polygalifolia*), *B. anemonifolia*, *B. nana*, *B. hyssopifolia* (= *B. nana* var. *hyssopifolia*), *B. bipinnata*, and *B. dentigera* F.Muell. (= *B. anemonifolia* subsp. *anemonifolia*). He retained this concept in his later publications (Mueller 1875, 1879, 1882, 1885, 1887-1888, 1889). Mueller (1875) referred to some specimens of *B. occidentalis* from north Queensland (from Newcastle Ra., Gilbert's R., Cape R.) as a bipinnate variety of *B. polygalifolia*. Bentham (1863) ignored most of Mueller's synonymy, but he did include *B. tetrathecoides* and *B. hyssopifolia* under the type variety and included three additional varieties: var. *trifoliolata* (= *B. nana* var. *nana*), var. *robusta* (= *B. rigens*) and, var. (?) *pubescens* (= *B. nana* var. *pubescens*). Bentham's classification was followed by Bailey (1899, 1913) and Maiden and Betche (1916). Tate (1890), Black (1924) and FNCV (1923, 1928) included *B. nana* under *B. polygalifolia* while Black (1948) reduced *B. oppositifolia* to varietal status under *B. polygalifolia* in his South Australian flora. Moore and Betche (1893) included *B. anemonifolia* as a variety of *B. polygalifolia*. Rodway (1903) synonimised *B. hyssopifolia* (= *B. nana* var. *hyssopifolia*) under *B. polygalifolia* in his *Tasmanian Flora* while Ewart (1931) included the concept of *B. nana* (less var. *pubescens*) under *B. polygalifolia* in his Victorian Flora. Later state floras (e.g. Curtis & Morris 1975; Armstrong & Telford 1986; Weston & Porteners 1991; Duretto 1999c; Weston & Duretto 2002) retain *B. nana* as distinct from *B. polygalifolia*.

The species is usually called the Milkwort-leaved Boronia (e.g. Beadle *et al.* 1962, 1972, 1982; Lebler 1972, 1977; Galbraith 1977; Stanley & Ross 1983; Weston & Porteners 1991; Caroline & Tindell 1993; McDonald *et al.* 1995; Weston & Duretto 2002) but it was called the Waxy Boronia by FNCV (1923, 1928), Ewart (1931) and Galbraith (1977) and the Polygala-leaved Boronia by Guilfoyle (1911). Guilfoyle (1911) appears to have documented or coined several other rarely used common names. The species is rare in cultivation and horticultural notes are given by Elliot and Jones (1982).

Distribution and ecology: *Boronia polygalifolia* is found from Kroombit Tops (Qld) to near Moruya and Geehi (NSW) (Fig. 4). The species is usually found in open forest and woodland or heath on sandy or granitic soils, or on rocky outcrops (e.g. in the Granite Belt and Glasshouse Mountains areas). The known distribution, ecology and conservation status of this species in the Central Tablelands and Central Coast areas (New South Wales) are discussed by Benson and McDougall (2001). *Boronia polygalifolia* was found to be self-compatible by Weston *et al.* (1984). Flowering and fruiting mainly September-January, though flowers are often present at other times of the year.

Conservation status: The species is widespread, fairly common and apparently secure. In the south-eastern forests of New South Wales, where it is known from one locality, the taxon is considered to be regionally uncommon (Keith & Ashby 1992). It is also considered to be rare and vulnerable in western Sydney (James *et al.* 1999; Benson & McDougall 2001).

Etymology: The specific epithet refers to the resemblance of the leaves of this species to those of *Polygala* L. (Polygalaceae).

Boronia Sm. section ***Boronia***

Hairs simple, stellate hairs absent. Leaves simple or pinnate; lamina terete of flat, margins not or slightly recurved, midrib not raised on abaxial surface, indented adaxially or not. *Inflorescence* axillary or terminal; prophylls and metaxyphylls persistent, or not (*B. barkeriana*). *Sepals* imbricate or valvate in bud, persistent with fruit, with or without terminal or subterminal apiculum abaxially. *Petals* imbricate in bud, not obviously glandular, caducous with fruit, sometimes tardily so (e.g. *B. microphylla*, *B. pilosa*), midrib not raised abaxially, tip with or without subterminal or terminal apiculum abaxially. *Stamens* 8, or 4-8 (*B. parviflora*), or 4 (WA), all fertile or 4 fertile (WA); anthers equal or unequal (WA), glabrous or with hairs, attached subterminally. *Disc* entire, within filament whorl, glabrous. *Seed* black to dark brown, shiny, elliptic in outline, adaxial margin convex; testa smooth; tubercula and wax platelets absent; hilum linear or elliptic, along adaxial margin; raphe fleshy; chalazal opening basal; placental endocarp membranous, caducous (see Wilson 1998).

Boronia section *Boronia* is confined to southern Australia with the northern most species being *B. rivularis* on Fraser Island (Qld). The section contains 58 species with 32 confined to south-western Western Australia, 25 confined to the eastern states, and one, *B. inornata* (*B.* series *Boronia*), found in Western Australia and South Australia. There are two series: *Pedunculatae* and *Boronia*.

Boronia section ***Boronia*** series ***Pedunculatae*** Benth., *Fl. Austral.* 1: [310] 326 (1863). *Lectotype species*: *B. spathulata* Lindl. *fide* Wilson, *Nuytsia* 1: 204 (1971).

Leaves simple. *Inflorescence* terminal, and sometimes in upper axils. *Sepals* valvate in bud, abaxial surface glabrous, usually caducous in fruit. *Stamens* 4–8 (*B. parviflora*) or 8 (*B. barkeriana*); anthers glabrous. *Seed* black; hilum linear along adaxial margin; raphe a cream to brown pulpy mass at base of seed; chalazal opening covered by raphe (see Wilson 1998).

The centre of diversity for *Boronia* series *Pedunculatae* is south-west Western Australia where nine species, some quite rare, are confined (see Wilson 1998). In eastern

Australia there are two species, one, *B. parviflora*, widespread and found in all eastern states, and the other, *B. barkeriana*, confined to New South Wales.

10. *Boronia parviflora* Sm., *Tracts nat. hist.* 295, t. 6 (1798). *Type citation*: type not cited. [Though specimens were not cited with the description Smith (l.c., p. 290), in the preamble of the paper, states 'Four species only of the genus in question have been hitherto been detected among dried specimens collected near Port-Jackson, by Mr. White'; later Smith (1807, p. 285) cites one specimen 'Gathered near Port Jackson, by Dr. White'.] *Type*: Port Jackson, New South Wales [c. 33°49'S 151°17'E, Central Coast], *Mr White s.n.*, 1795 (lectotype, here designated, LINN *684.8 n.v.* [specimens numbered 1; transparency MEL *2041283*]. [Note: see *B. polygalifolia* re Mr White].

Boronia pilonema Labill., *Nov. Holl. pl.* i. 98. t. 126 (1805). *Type citation*: 'in capite Van-Diemen.' *Type*: *n.v.* Illustration decisive.

Boronia colorata Lehm. ex Bartl. in *Pl. Preiss.* 2: 226 (1848). *Type citation*: "In regionibus interioribus Australiae meridionali-occidentalis m. Nov. 1840, Herb. Preiss. No. 2627"; *Type*: Herb. Preiss No. 2627 (lectotype, here designated, LD *94036 - 0995* [transparency MEL *2068533*]). [Note: Locality information incorrect: the species is not found in Western Australia.]

Boronia palustris Maiden & J.Black, *Trans. & Proc. R. Soc. South Australia* 35: 1, pl. 1 (1911). *Type citation*: "Found in flower by H.H.D. Griffith on the edge of swamps near Cape Borda and Starvation Ck, Kangaroo Island, October, 1908." *Type*: Swamp 12 miles [c. 19.2 km] from Cape Border, Kangaroo Is. [35°45'S 136°35'E, South Australia] ['also Starvation Ck' written in a different pen to the original], *H.H.D. Griffith* s.n., x.1908 (holotype AD *99436222* [top left hand specimen, ex herb. J.M. Black]; isotype MEL *246780*).

Illustrations: Smith (*l.c.*); J.H. Labillardiere (*l.c.*), as *B. pilonema*; J.H. Maiden and J.M. Black (*l.c.*), as *B. palustris*; J.M. Black, *Fl. S. Austral.* 2: 336, Fig. 154D (1924), as *B. palustris*; J.M. Black, *Fl. S. Austral.* 2nd edn, 2: 494 Fig. 665 (1948), as *B. palustris*; J. Garnet, *The Wildflowers of Wilson's Promontory* 147, Fig. 538 (1971); B. Conabee and J. Garnet, *Wildflowers of South Eastern Australia*, Vol. 1, pl. 15(5) (1974); A. Fairley and P. Moore, *Native Plants of the Sydney District*, 236, pl. 820 (1989), photograph; L. Robinson, *Field Guide to the Native Plants of Sydney*, 116 (1991); P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 234 (1991); I.R. McCann, *The Grampians in Flower*, 100 (1994), excellent photograph; M.F. Duretto, *Fl. Victoria* 4: 163, Fig. 29h (1999); M.G. Corrick and B.A. Fuhrer, *Wildflowers of Victoria* 207 (2000), photograph; P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 274 (2002).

Weakly ascending herb to sub-*shrub* to 50 cm tall, glabrous apart from flowers. *Branchlets* not obviously glandular, without obvious leaf decurrencies. *Leaves* sessile, 7–28 mm long, (0.5–)1.5–7.5 mm wide, linear to narrow elliptic to elliptic or obovate, flat, not obviously glandular, concolorous, dorsiventral, spongy and palisade mesophyll not always clearly differentiated, margins entire to slightly crenate, tip acute. *Inflorescence* 1(–3)-flowered; peduncles absent or 0.5–2(–7) mm long; metaxyphylls at base of anthopodia, 1.5–10 mm long, usually caducous; anthopodia 2–10 mm long. *Sepals* green to purple, deltate to ovate, 2.5–5.5 mm long, 1–2.5 mm wide, smaller or as long as or just longer than the petals, adaxial surface glabrous or puberulous towards apex to entire surface apart from near margins, usually caducous, tip acute. *Petals* white to pink, 3–5.5(–7) mm long, 1.5–2.5 mm wide, adaxial surface glabrous or glabrescent to pilose, margins ciliate or with few simple hairs towards apex. *Stamens* 4–6(SA, Vic.)–8(all eastern states), filaments glabrous to pilose, eglandular to glandular; anthers with or without minute apiculum. *Gynoecium* glabrous; stigma entire, minute, slightly wider than style. *Cocci* 2–4 mm long, 1.5–2.5 mm wide, glabrous. *Seed* 1.25–2 mm long, 1–1.5 mm wide. n=9 (Smith-White 1954; Stace *et al.* 1993). **Small Boronia, Tiny Boronia, Swamp Boronia, Small-flowered Boronia.**

Representative specimens (c. 500 specimens examined): **QUEENSLAND**: MORETON: Peregian Swamp, Peregian, c. 4 km N of Coolum Beach, c. 1 km N of Mt Emu Rd, 26°29'S 153°05'E, *P.R. Sharpe 4959 and G. Thomas*, 29.viii.1990 (BRI); Bribie Is., *S.T. Blake 13850*, 18.ix.1938 (BRI, CANB); Stradbroke Is., *R. Perry s.n.*, 28.ix.1947 (BRI *AQ478103*, CANB); **NEW SOUTH WALES**: NORTHERN TABLELANDS: Middle Rd, S Boonoo Boonoo NP, 35 km NE of Tenterfield, 28°51'S 152°09'E, *N.L. Fitzpatrick s.n.*, 6.ii.1994 (NE *59077A*); NORTH COAST: 28.2 km from Grafton clock-tower towards Coaldale, 28°37'S 152°52'E, *M.F. Duretto 671, P.G. Neish and I. Thompson*, 24.x.1995 (MEL, NSW); 2.2 miles [c. 3.5 km] S of Arakoon, 30°55'S 153°03'E, *R. Coveny 42472 and J.A. Armstrong*, 25.viii.1972 (CANB, NSW); Bombal Point, Lake Myall, *E.F. Constable s.n.*, 21.i.1952 (NSW *19173*); CENTRAL COAST: La Perouse, 34°00'S 151°14'E, *R.G. Coveny 11141 and J. Thomas*, 7.vii.1982 (CANB, MEL, NSW); SOUTH COAST: Tianjara Falls, c. 2.4 miles (6.4 km) E of Sassafras on the Nowra-Nowra Rd, 35°07'S 150°20'E, *R. Coveny 4015*, 12.iii.1972 (NSW); **AUSTRALIAN CAPITAL TERRITORY**: 2.2 Miles (3.5 km) SW of Jervis bay on the Caves Beach Rd, 35°09'S 150°41'E, *R. Coveny 3757*, 13.x.1971 (NSW); **VICTORIA**: GRAMPIANS: Serra Rd at its crossing of Glenelg River, 37°18'S 142°24'E, *M.G. Corrick 5739*, 20.xi.1976 (MEL); WANNON: Gorae West, near Portland, *A.C. Beauglehole 3842*, xi.1946 (MEL); Near Coolgardie Swamp, Mt Clay, c. 11 miles [c. 17.6 km] NNE of Portland, *P.E. and E.W. Finck and A.C. Beauglehole 3846*, i.xi.1953 (MEL); OTWAY PLAIN: Corangamite, Otways, 5 km SE of Barongarook, 38°28'S 143°39'E, *S.G. Harris 80*, 26.ix.1985 (CANB, MEL); OTWAY RANGE: Glen Aire, 7 miles [c. 11.2 km] NW of Cape Otway, *W. Denney s.n.*, 29.ix.1952 (MEL); GIPPSLAND PLAIN: Mornington Peninsula, Greens Bush NP, *W.R. Archer s.n.*, 28.x.1979 (MEL *1516616*); WILSON'S PROMONTORY: Vereker Range gate on 5 mile Rd, *J.H. Willis s.n.*, 3.x.1973 (MEL); EAST GIPPSLAND: 4.4 km SE of Mt Carlyle summit, 37°30'S 149°55'E, *D.E. Albrecht 3615 and N.G. Walsh,* 4.viii.1988 (CANB, MEL); **SOUTH AUSTRALIA**: SOUTHERN LOFTY: Square Waterhole, c. 2.5 km S of Mt Compass, *Hj. Eichler 13874*, 30.vi.1957 (AD); KANGAROO ISLAND: "Brookland Park"; 10 km N of South Coast Rd, 3 km E of Western Hwy, c. 80 km WSW of Kingscote, *P.G. Wilson 808*, 8.xi.1958 (AD, BRI, CANB, HO *n.v.,* MEL, NSW *n.v.*); SOUTH EASTERN: Honan's Natural Forest Reserve, N of Mt Gambier, *P.B. Copley 311*, 26.ix.1978 (AD); Mt Burr Swamps, 37°39'S 140°32'E, *J.R. Dodson 120*, 19.ii.1972 (AD); **TASMANIA**: KING ISLAND: Old Tin Mine Rd, c. 39°51'S 143°58'E, *I.D. Cameron s.n.*, xii.1963 (HO); FURNEAUX GROUP: Flinders Is., Patriarchs Wildlife Refuge, 22 km NE of Whiemark, 39°59'S 148°13'E, *I. Crawford 1183*, 12.xii.1988 (CANB, HO, MEL); WEST COAST: Nelson Bay River, 41°16'S 144°52'E, *A. Moscal 4877*, 15.xii.1983 (HO); NORTH EAST: Bay of Islands, 40°59'S 148°19'E, *A. Moscal* 3609, 18.x.1983 (HO); SOUTH EAST: Freycinet Peninsula NP, c. midway between Wineglass Bay and Hazards Bay, 42°10'S 148°18'E, *P.S. Short* 1904, 2.ii.1983 (CANB, HO, MEL); Sung Falls Track, 43°05'S 147°12'E, *S.J. Jarman and G. Kantvilas 41*, 18.xi.1979 (AD, HO, MEL); Fortescue Bay to Cape Hauy track, 43°09'S 147°58'E, *A.E. Orchard 5157*, 18.xii.1980 (HO, MEL); Blackmans Bay, 43°00'S 147°19'E, *H.D. Gordon s.n.*, 14.xi.1938 (HO *4609*); SOUTH WEST: Point Hibbs (Meerum Beach-Whitehorse Beach), 42°37'S 145°17'E, *A. Moscal 5713*, 17.i.1984 (HO); South West Cape, between Deadmans Bay and Lousy Bay, 43°32'S 146°29'E, *A.M. Buchanan 9617*, 19.i.1987 (HO).

Notes: *Boronia parviflora* has an interesting taxonomic history, being one of the first species of the genus described and subsequently with a number of its forms being described as individual species. It is also a widespread species found in a variety of habitats (see *Distribution and ecology*). *Boronia pilonema* was based on a Tasmanian form but was later synonymised under *B. parviflora* by Bentham (1863). J.D. Hooker (1855) indicated that *B. pilonema* was found in both Tasmania and South Australia and was accepted for Tasmania by Curtis (1956) who noted that the taxon was also found in Victoria. The South Australian *B. palustris* was described from specimens with four stamens (see also below) and Black (1924, 1948) included both *B. parviflora* and *B. palustris* in his South Australian Floras. Willis (1957, 1973) discussed this taxonomy and concluded that the various forms grade into each other. Bentham (1863) considered that *B. colorata* was referable to *B. viminea* (= *B. crenulata* var. *viminea*, Wilson 1998), a Western Australian species, but he had only seen the description and not the type. A broader concept of *B. parviflora* has been followed in recent floras (e.g. Curtis & Morris 1975; Armstrong & Telford 1986; Stanley & Ross 1983; Weston & Porteners 1991; Duretto 1999c; Weston & Duretto 2002) and here.

There is some striking morphological variation in *B. parviflora* mainly in leaf size and shape as well as the relative number and size of floral parts. Some of the more striking forms have been described as separate species (see above) though on examination of all material these forms break down and none are formally recognised. *Boronia parviflora* has one of the widest distributions of any *Boronia* and is found in a extensive variety of habitats, from montane wet heath to coastal woodland, which may account for some of this variation.

Stamen number is variable in western Victorian and South Australian populations. This observed variation is due in part to the stamens being deciduous. Populations can have plants with four, six or eight stamens (e.g. *Beauglehole 3842*). Flowers on the one plant may also have four, six or eight stamens (e.g. *Finke and Beauglehole 3846*). These collectors noted that the specimen when collected had flowers with four, six or eight stamens and as the stamens matured they 'fell out' until there were four left. Beauglehole, in a letter to Willis (dated 11/12/1955 – with *Finke and Beauglehole 3846,* MEL *1561986*; see also Willis 1957), indicated that he had examined 100's of flowers in the Mt Clay area and discovered that the majority of flowers had four stamens and the remainder had five to eight stamens. He noted that four of the stamens are early deciduous. Stamen number, in conjunction with the sepals being longer than the petals, was used to distinguish *B. palustris* (SA, W Vic.) from *B. parviflora*. When describing *B. palustris*, Maiden and Black (1911) considered that this species was intermediate between *Boronia* and *Zieria* Sm. with the thick and entire disk of *Boronia* and the four stamens of *Zieria.* They did state that in habit *B. palustris* is closest to *B. parviflora* and can be distinguished from it by stamen number and by having sepals that are longer than the petals. Sepal length is variable in *B. parviflora* though the specimens with sepals longer than the petals are usually found in South Australia and western Victoria (see also Willis 1957, 1973).

In a letter from Reverend Rupp to Rodway (dated 27/10/1924, with a specimen of *B. barkeriana*, *Rodway 1100–1*, NSW *385392*) Rupp states that the difference between *B. barkeriana* and *B. parviflora* is the prolific flowers of the former. He added that forms of *B. parviflora* from Byron Bay and Smiths Lake (NC, NSW) can be three feet high and have mauve flowers and may be more different from *B. parviflora* than from *B. barkeriana*. While these plants (e.g. *Duretto 671*) are tall they belong with *B. parviflora.*

In western Tasmania there is a dwarf form of *B. parviflora* with narrow leaves (e.g. *Buchanan 9617, Moscal 5713*) that seems to be confined to near coastal areas and button grass communities. These plants rarely exceed five cm in height. The leaf length:leaf width ratio is high (5-7) and the leaves are usually less than 12 mm long. Small and narrow leaved specimens of *B. parviflora* have been collected across Tasmania and in western Victoria and South Australia but then usually associated with larger and wider leaved individuals. Many of south-west Tasmanian plants have densely packed leaves and despite their small size may be several years old as they appear to produce a rosette of leaves each year and have 'scar rings' along the stems from previous 'leaf whorls'. Other populations may behave as annuals. A sheet at HO (*Gordon s.n.* HO *4609*) has an annotation, presumably by W. Curtis (signed WMC), stating 'I suspect this is an annual plant. I find it like this each year in the same locality but no sign of larger, more woody plants. WMC'.

Some plants from the Sydney and Portland (e.g. *Woolcock 1279*) areas have slightly larger flowers and a cluster of inflorescences (terminal and upper axillary) that are aggregated into a compact head. Some of these individuals have three flowers per inflorescence, as opposed to the normal one.

When describing *B. parviflora*, Smith (1798) called it the Pale-flowered Boronia, a name that has not gained use. Horticultural notes on *B. parviflora* are given by Elliot and Jones (1982).

Distribution and ecology: *Boronia parviflora* is one of the most widespread Boronias being found in Queensland, New South Wales, Victoria, South Australia and Tasmania. No other species is found in all four south-eastern Australian mainland states let alone

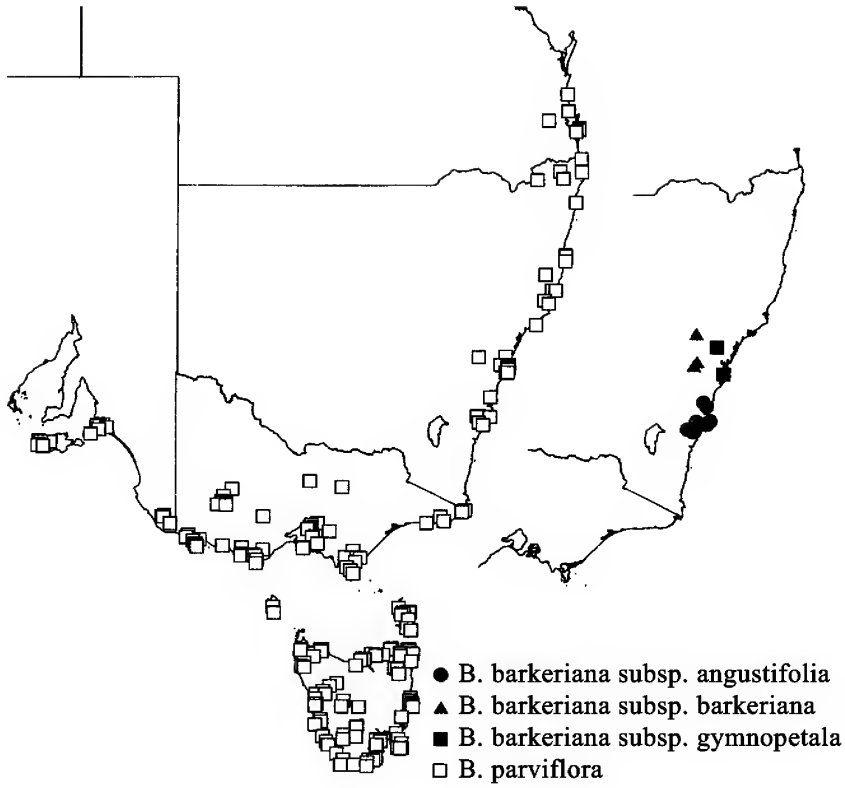

Figure 5. Distribution of *B. barkeriana* subsp. *angustifolia*, *B. barkeriana* subsp. *barkeriana*, *B. barkeriana* subsp. *gymnopetala*, *B. parviflora*.

Tasmania as well. It is also found in a remarkable variety of habitat types. In Queensland and New South Wales *B. parviflora* is uncommon in coastal swampy or wallum heath or woodland over sand or sandstone south from the Sunshine Coast (Qld), with a disjunct population at Boonoo Boonoo on the Northern Tablelands of New South Wales (Fig. 5). In Victoria and South Australia the species is found in seasonally wet heath and woodland and is widespread, though scattered, from Mallacoota (Vic.) to the Fleurieu Peninsula and Kangaroo Island (SA). The species is found on all major Bass Strait Islands and is scattered across Tasmania though it is absent from alpine areas. In Tasmania it is found in button grass communities, short to tall heath and other swampy areas. The known distribution, ecology and conservation status of this species in the Central Tablelands and Central Coast areas (NSW) are discussed by Benson and McDougall (2001). *Boronia parviflora* was found to be self compatible by Weston *et al.* (1984). Flowering and fruiting August-March(-July).

Myrmecochory (seeds dispersal by ants) is widespread in the Australian sclerophyllous vegetation of Australia (Berg 1975). The seeds of *Boronia* appear to be adapted for myrmecochory as they are usually smooth, shiny and have a nutritious elaiosome that may or may not be detachable (see Berg 1975; Auld 2001), though this mechanism has been confirmed for few species, e.g. for *B. fraseri* Hook., *B. ledifolia* (Vent.) DC (both *B.* section *Valvatae*), *B. parviflora*, *B. pinnata* and *B. serrulata* (Rice & Westoby 1981).

The fruit of *B. parviflora* have been observed to be eaten by the orange-bellied parrot in south-west Tasmania (Brown pers. com., cited in Jarman *et al.* 1988, p. 22).

Conservation status: *Boronia parviflora* is widespread, found in many reserves across its range and is probably secure. The variation discussed above appears to be represented in reserves.

Etymology: The specific epithet is derived from the Latin, *parvus* (small) and *florus* (flower), and is presumably alluding to the small flowers of this species.

11. *Boronia barkeriana* F.Muell., *Fragm.* 11: 96 (1880). *Type citation*: "In tractu elato "Blue Mountains" dicto haud procul a monte Wilsoni, altitudine 3650 pedum supra mare, in regione arenoso-rupestri. Domina C.A. Barker." *Type*: Blue Mountains, *Miss C.A. Barker* (lectotype, here designated, MEL *248922*).

Illustration: A. Fairley and P. Moore, *Native Plants of the Sydney District*, 236, pl. 821 (1989), photograph.

Erect or spreading, woody *shrub* to 1m tall, glabrous apart from flowers, will regrow from rootstock (subsp. *gymnopetala*). *Branchlets* often reddish, not obviously glandular, leaf decurrencies faint or absent. *Leaves* sessile or subsessile; lamina 7–33 mm long, 1.5–11 mm wide, linear-elliptic to narrow-elliptic, or linear-obovate to obovate or oblanceolate, often reddish on lower surface and along margins, flat, concolorous, almost isobilateral (subsp. *angustifolia*), palisade and spongy mesophyll not well differentiated, margins entire to serrate, apex acute to acuminate. *Inflorescence* 1–8(–12)-flowered; peduncles 1–9.5 mm long; prophylls 3–7 mm long, caducous; metaxyphylls vestigial, caducous, placed proximally on anthopodia; anthopodia 5–15(–23) mm long. *Sepals* purple, deltate to ovate, 2–8 mm long, 1–6 mm wide, not obviously glandular, adaxial surface sparsely to densely puberulous, caducous in mature fruit. *Petals* bright pink to mauve-pink, 5–11 mm long, adaxial surface glabrous or sparsely pilose, abaxial surface glabrous, tip slightly mucronate. *Staminal filaments* pilose, glandular tuberculate towards apex; anthers with or without a minute apiculum. *Gynoecium* glabrous; stigma as wide or slightly wider than the style. *Cocci* 3.5–4.5 mm long, 2–2.5 mm wide, glabrous. *Seed* 1.5–2 mm long, 1–1.25 mm wide. n=9 (Smith-White 1954; Stace *et al.* 1993). (Figs 6 A-E). **Barker's Boronia.**

Distribution and ecology: *Boronia barkeriana* is [or was] found in disjunct populations in Wollomi National Park, the Blue Mountains (subsp. *barkeriana*), the Sydney Harbour area and Royal National Park (subsp. *gymnopetala*), and south to Jervis Bay and Barren Ground National Park (subsp. *angustifolia*) (Fig. 5). Interestingly, Robinson (1991) indicated that the species is found, in the Sydney District, only in Royal National Park [it is also found in the Blue Mountains - see discussion under subsp. *gymnopetala*], and erroneously includes, as do Fairley and Moore (1989), Weston and Porteners (1991) and Benson and McDougall (2001), Queensland in the distributional data for the species. *Boronia barkeriana* is found in heath and woodland on sandstone and sand. The known distribution, ecology and conservation status of this species in the Central Tablelands and Central Coast areas (NSW) are discussed by Benson and McDougall (2001). The species was found to be self incompatible by Weston *et al.* (1984). Flowering and fruiting (April-August-)September-December.

Key to subspecies of B. barkeriana

1. Sepals 3.5–6 mm wide, ovate; adaxial surface of petals glabrous; distal end of anthopodia c. 1.5–2mm wide .....**11b.** subsp. ***gymnopetala***
1: Sepals 1.5–3 mm wide, triangular; adaxial surface of petals glabrescent to sparsely and minutely pilose; distal end of anthopodia c. 1 mm wide.....2
2. Leaves elliptic to oblanceolate to obovate, margins distinctly serrate, larger leaves 2.5–3.8 times as long as wide .....**11a.** subsp. ***barkeriana***
2: Leaves almost always narrow-elliptic to narrow-oblanceolate to narrow-obovate, margins entire to slightly serrate, larger leaves 4.4–7.7 times as long as wide ....**11c.** subsp. ***angustifolia***

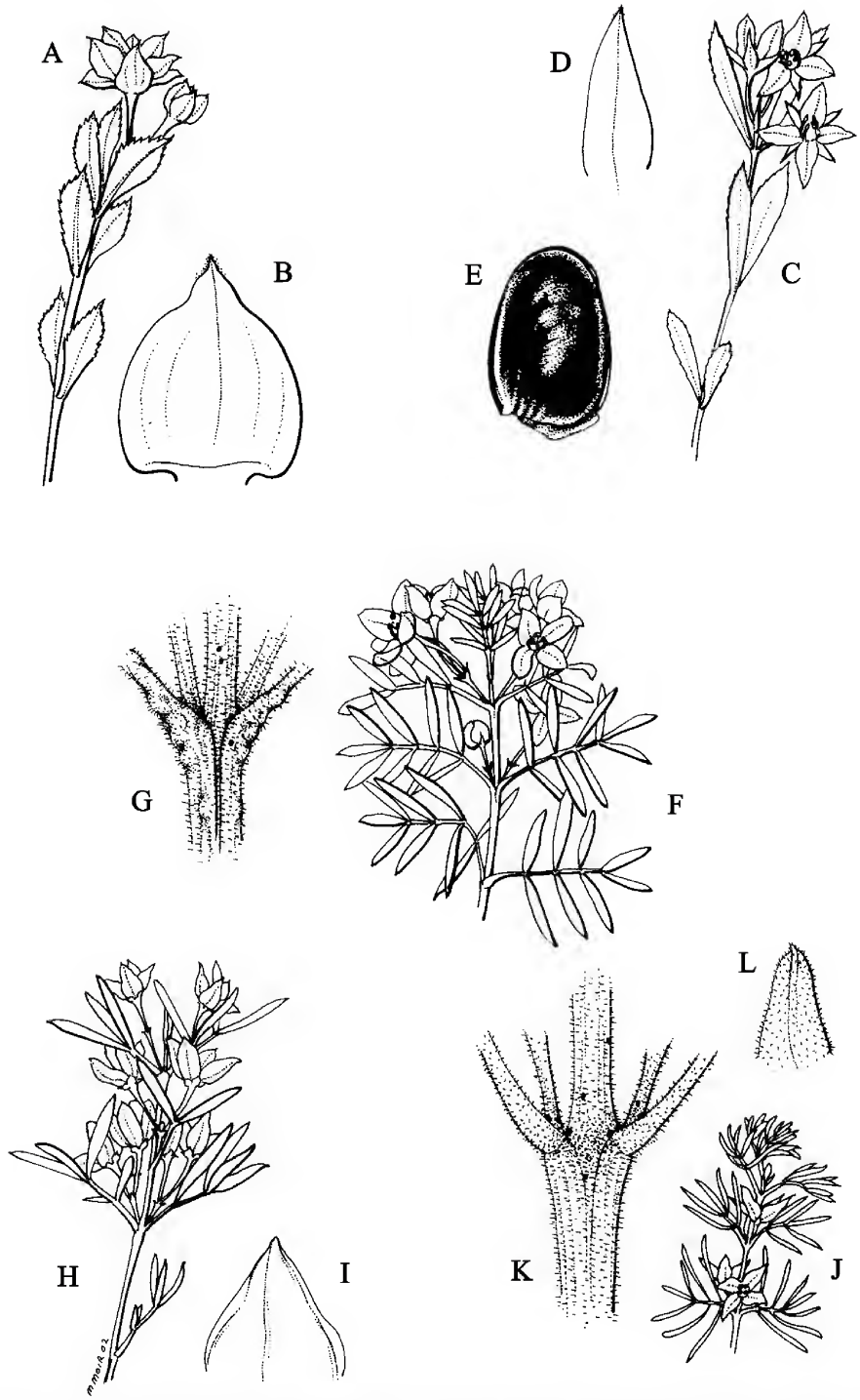

Figure 6. A-B, *B. barkeriana* subsp. *gymnopetala*: A, flowering branchlet, × 1; B, abaxial surface of sepal, × 5 (*Stack s.n.*, NSW *385372*). C-E, *B. barkeriana* subsp. *angustifolia*: C, flowering branchlet, × 1; D, abaxial surface of sepal, × 5; E, seed, × 10 (C-D, *Duretto 695,* MEL *2046112*; E - *Telford 9608*, CANB *CBG8616584*). F-G, *B. imlayensis*: F, flowering branchlet, × 1; G, stem, × 5 (F-G, *Duretto 715*, MEL *2046130*). H-I, *B. citriodora* subsp. *paulwilsonii*: H, flowering branchlet, × 1; I, abaxial surface of sepal, × 5 (H-I, *Duretto 833*, MEL *2045790*). J-L, *B. citriodora* subsp. *orientalis*: J, flowering branchlet, × 1; K, stem, × 5; L, abaxial surface of sepal, × 5 (J-L, Burns 244, HO *4565*).

11a. ***Boronia barkeriana*** F.Muell. subsp. ***barkeriana***

Illustrations: P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 234 (1991), as *B. barkeriana*; P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 273 (2002). Leaf lamina (8–)16–30 mm long, (2.5–)4–11 mm wide, elliptic to obovate or oblanceolate, larger leaves with a leaf length:leaf width ratio of 2.5–3.8, margins serrate. *Inflorescence* 3–9-flowered; anthopodia 8–14(–23) mm long. *Sepals* 3.5–6.5 mm long, 2–3 mm wide. *Petals* 6–8 mm long, adaxial surface sparsely and minutely pilose. *Staminal filaments* with hairs c. 0.5 mm long. *Cocci* 3.5–4.5 mm long. *Seed* 1.5–1.75 mm long, 1–1.25 mm wide.

Additional specimens examined: **NEW SOUTH WALES**: CENTRAL TABLELANDS: On fire-trail between Kekeelbon Mountains and Mt Coricudgy, c. 25 miles [c. 40 km] east of Rylstone, *D.J. McGillivray 1618*, 13.ii.1966 (NSW); Kekeelbon Mts, 1.25 miles [c. 2 km] SE of 'Three Ways' on Putty Fire Trail, *T. and J. Whaite 3291*, 1.ix.1969 (NSW); Rodriguy Pass, Blackheath, *G. Gardener s.n.*, 16.xii.1951 (NSW *385381*); Govetts Leap, Blackheath, Blue Mountains, *E.F. Constable 5578*, 10.xii.1964 (NSW); *ibid*, *E.F. Constable 6133*, 29.ix.1965 (NSW); *ibid*, *N. Hudson s.n.*, x.1911 (NSW *385382*); *ibid*, *R.T. Baker s.n.*, xi.1900 (NSW *385383*); *ibid*, *C. Burgess s.n.*, 12.x.1960 (CANB *CBG3126*); *ibid*, *C. Burgess s.n.*, 10.xii.1962 (CANB *CBG3118*); below Aerodrome, Hat Hill Rd, Blackheath, Blue Mountains, *E.F. Constable 4664C*, 19.xi.1963 (NSW); Hat Hill, Blackheath, *E.F. Constable s.n.*, 10.xii.1946 (NSW *3090*); Hat Hill Ck, Blackheath, *E.F. Constable s.n.*, 25.xi.1953 (NSW *385385*); Blackheath, *W.M. Crane s.n.*, ix.1910 (NSW *385384*); *ibid*, *E.F. Constable s.n.*, 17.i.1950 (NSW *11431*); *ibid*, *J.H. Boorman s.n.*, xi.1918 (NSW *385386*); *ibid*, *G.H. Clarke s.n.*, xi.1920 (CANB *5433*); *ibid*, *G.W. Althofer 67*, 30.xii.1946 (MEL); *ibid*, *E. Cheel s.n.*, xii.1900 (MEL *1058149*, NSW *n.v.*); *ibid*, *A.A.K. Petrie s.n.* (MEL); between Blackheath and Mount Victoria, *J.H. Maiden* s.n., 1.x.1886 (NSW *385387*); Wollongumbie Ck, Mt Wilson, *I. Gregson s.n.*, 23.ii.1898 (NSW *385376*).

Distribution and ecology: *Boronia barkeriana* subsp. *barkeriana* is restricted to the Blue Mountains and disjunctly north between Kekeelbon Mountains and Mt Coricudgy (Fig. 5). It is usually found in heath in damper areas. Flowering September-November, rarely April; fruiting November-December, rarely April.

Conservation status: The subspecies is restricted in distribution though found in a number of national parks. There are few collections of this taxon and the youngest specimen seen by the author was made in the 1960's. Whether this reflects rarity or a lack of collecting is not known and field research assessing the conservation status of this taxon is warranted. For now a conservation code of 2RC- is appropriate.

11b. ***Boronia barkeriana*** subsp. ***gymnopetala*** Duretto, *subsp. nov.*

A subspecie typica sepalis grandioribus et petalis in pagina adaxiali glabris differt.

Type: NEW SOUTH WALES: Mosman Bay, *anon.*, x.1891 (holotype NSW *385373* [ex Museum of Applied Arts and Sciences 1979; transparency MEL *2068534*]).

Illustration: P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 274 (2002). *Shrub*, will regrow from rootstock. *Leaf* lamina 12–23 mm long, 4–9 mm wide, obovate to oblanceolate, larger leaves with a leaf length:leaf width ratio of 2.4–3.3, margins serrate. *Inflorescence* 1–3-flowered; anthopodia 11–15 mm long. *Sepals* 6–7 mm long, 4–6 mm wide. *Petals* 6–11 mm long, adaxial surface glabrous. *Staminal filaments* with hairs 0.25–0.5 mm long. *Cocci* and seed not seen. (Figs 6 A-B).

Additional specimens examined: Syrius [? Szrius] Cove [= Sirius Cove?], *Mr Black s.n.*, x.1894 (NSW *385371*); Port Jackson District, *F.*[?], ix.1898 (MEL *2097893*, ex NSW); Waterfall [34°08'S 150°59'E], *A.A. Hamilton s.n.*, x.1908 (NSW *385404*); Mosman Bay, anon., *x.1891* (NSW *385373*); Loftus, Nat. Park, *Boorman s.n.*, 6.ix.1898 (NSW *385407*); Guyra, National Park, *H.R. Pier* s.n., 8.10.1923 (NSW *385375*); National Park, anonymous, x.1890 (MEL *2097898*).

Notes: *Boronia barkeriana* subsp. *gymnopetala* differs from the other subspecies by the large sepals (6–7 mm long, 4–6 mm wide; cf. 3–6.5 mm long, 1.5–3 mm wide) and glabrous adaxial surface of the petals (cf. puberulous).

Distribution and ecology: *Boronia barkeriana* subsp. *gymnopetala* is known from seven collections made in and around the Sydney area from Mossman Bay to Waterfall (Fig. 5). Collections from Guyra (*Pier s.n.* NSW *385375*) and Loftus (*Boorman s.n.*, NSW *385407*) were made within "National Park" and as Royal National Park was the only National Park in New South Wales (if not Australia) at the time, it can be safely assumed that these collections were made from there (G. Harden, NSW, pers. com.). Presumably the subspecies grew in open woodland or heath on sandstone. Flowering material has been collected in September and October.

The Boorman collection (NSW *385407*) and another collection (*anonymous*, MEL *2097898*) are of note as they are of entire plants and illustrate that *B. barkeriana* subsp. *gymnopetala* can regrow from a rootstock after fire (viz. it is a resprouter). Maiden (1892) referred to collections of *B. barkeriana* from Little Sirius Cove (Port Jackson) made by Mr J. Stack which were believed to be the first Sydney record of the species. These specimens would be referable to *B. barkeriana* subsp. *gymnopetala* and it is of interest that Maiden stated that the lower leaves were succulent, almost fleshy, and the plants [presumably the flowers] had an odour stronger than that of *B. serrulata*.

Conservation status: *Boronia barkeriana* subsp. *gymnopetala* has not been collected since 1923 despite being found in a well populated area, and is presumed to be extinct: a conservation code of 2X is appropriate. Benson and McDougall (2001) noted that *B. barkeriana* was recorded from Little Sirius Cove (Mossman) in 1891 but that it was likely to be extinct there now. Surveys of the remnants in the Sydney greater metropolitan area, especially Royal National Park, would be warranted. *Boronia adamsiana* F.Muell. and *B. keysii* Domin (both section *Valvatae*) have both been recorded as extinct and both have been recollected subsequently and are now known from secure populations (see Duretto 1999b). *Boronia barkeriana* subsp. *gymnopetala* has the dubious distinction of being the only *Boronia* presently to be recorded as extinct.

Robinson (1991) indicated that *B. barkeriana* is known locally [in the Sydney district] from Royal National Park, where, for the species, only *B. barkeriana* subsp. *gymnopetala* has been collected. This is interesting because, firstly, Robinson did not list the Blue Mountains, as he does for *B. floribunda*, where the type subspecies is found, and secondly, if his observations are based on field observations then *B. barkeriana* subsp. *gymnopetala* may not be extinct. The data, of course, could be based on herbarium records. His drawings, illustrating narrow leaves with smooth margins and long pedicels, look as though they were based on material of *B. barkeriana* subsp. *angustifolia*.

Etymology: The epithet is derived from the Greek, *gymno* (naked) and *petalon* (petal) referring to the glabrous petals which distinguish it from the other subspecies.

11c. *Boronia barkeriana* subsp. ***angustifolia*** Duretto, *subsp. nov.*

A subspecie typica foliis ellipticis angustis ad obovatos angustos, ad marginem laevibus vel serratis leviter differt.

Type: NEW SOUTH WALES: Entrance to Budderoo NP on road to Jamberoo from Roberton, 34°39'S 150°42'E, *M.F. Duretto 695, P.G. Neish and I. Thompson*, 28.x.1995 (holotype MEL *2046112*; isotypes CANB, HO, MEL *2046113*, NSW). (Figs 6 C-D).

Illustrations: L. Robinson, *Field Guide to the Native Plants of Sydney*, 115 (1991), as *B. barkeriana* [identification based on illustration]; P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 273 (2002).

Leaf lamina (8–)15–33 mm long, 1.5–6.5 mm wide, narrow-elliptic to narrow-obovate, larger leaves with a leaf length:leaf width ratio of 4.4–7.7, almost isobilateral, palisade and spongy mesophyll not well differentiated, margins entire or slightly serrate. *Inflorescence* (1–)3–8(–12)-flowered; anthopodia 5–14 mm long. *Sepals* 3–6 mm long, 1.5–2.5 mm wide. *Petals* 5–10 mm long, adaxial surface glabrescent to sparsely puberulous. *Staminal filaments* with hairs c. 0.5 mm long. *Cocci* 3.5–4.5 mm long. *Seed* c. 2 mm long, c. 1.25 mm wide. (Figs 6 C-E).

Representative specimens (c. 40 specimens examined): **NEW SOUTH WALES**: WESTERN SLOPES: Head of Diorite Ck near Turpentine, *A. Floyd s.n.*, 3.ix.1952 (NSW *385398*); CENTRAL TABLELANDS: Carrington Falls, 34°38'S 150°41'E, *S. Smith-White and H. Lancaster s.n.*, ix.1951 (NE *10938*); Budderoo NP, 2.5 km at 130 from Gerringong Falls, 34°41'S 150°41'E, *I. Crawford 979*, 4.8.1988 (CANB, NSW *n.v.*); SOUTHERN TABLELANDS: Gungenare Mt near Braidwood, *W. Bauerlen s.n.*, xi.1886 (NSW *385374*); 5 km WNW of Porters Ck Reservoir, Tianjara area, 35°16'S 150°18'E, *K. Paijmans 4023*, 19.v.1981 (CANB); c. 2 km W of Mt Corang, N Budawang Range and c. 32 km NE of Braidwood, 35°17'S 150°05'E, *R. Pullen and J. Storey 4980*, 26.ix.1973 (CANB, NSW); 7 km SW of Porters Ck Reservoir, Tianjara area, 35°20'S 150°19'E, *K. Paijmans 4064*, 12.vi.1981 (CANB); 2 km NE of Round Hill, Budawangs, *J.A. Armstrong 112-3*, 9.xii.1972 (NSW); SOUTH COAST: Tianjara Falls, c. 35 km SW of Nowra, *I.R. Telford 9886*, x.1984 (AD, CANB, MEL); Pigeon House, Milton, *R.H. Cambage 4172*, ix.1915 (MEL, NSW); The Castle, Budawang Range, 35°18'S 150°12'E, *I.R. Telford BR201*, 5.x.1971 (CANB); Morton NP, northern Budawang Range, c. 3 km N of The Castle, 35°16'S 150°11'E, *P. Gilmour 5274*, 3.x.1985 (CANB); Budderoo Ck, c. 10 miles [16 km] W of Kiama, *E.F. Constable 6267*, 15.x.1965 (NSW); Vicentia, near water tower, *K. Elgerod 87416b*, 22.x.1987 (NSW); Tambaroo Mtn, *J. Close s.n.*, xi.1920 (NSW *385405*); Drum and Drumsticks, near Point Perpendicular, *F.A. Rodway 1099*, 23.x.1932 (NSW); Bowen Is., *R.A. Rodway s.n.*, xii.1925 (NSW *385394*); Roseby Park, mouth of Shoalhaven River, *R.A. Rodway 1104*, 15.x.1935 (NSW); **AUSTRALIAN CAPITAL TERRITORY**: 2.2 miles (3.5 km) SW of Jervis Bay on Caves Beach Rd, 35°09'S 150°41'E, *R. Coveny 3758*, 13.x.1971 (NSW); 2.4 miles (3.9 km) SW of Jervis Bay on Caves Beach Rd, 35°09'S 150°41'E, *R. Coveny 3749*, 13.x.1971 (NSW).

Notes: *Boronia barkeriana* subsp. *angustifolia* differs from the other subspecies by the narrow elliptic to narrow-obovate leaves (1.5–6.5 mm wide, leaf length:leaf width = 4.4–7.7; cf. obovate to oblanceolate, 4–11 mm wide, leaf length:leaf width = 2.4–3.8) with smooth to slightly serrate margins (cf. serrate). Some of the material from Jervis Bay and the mouth of the Shoalhaven River have leaves that approach the typical form.

Distribution and ecology: *Boronia barkeriana* subsp. *angustifolia* is found mainly from Budderoo National Park to Budawang Range, and in the Shoalhaven Heads to Jervis Bay area (Fig. 5). The subspecies is found in woodland and heath on sandstone derived soils. Flowering and fruiting mainly October-December, though flowering material has been collected in June and August.

Conservation Status: The subspecies is found in various reserves and appears secure.

Etymology: The subspecific epithet is derived from the Latin, *angustus* (narrow) and *folium* (leaf) and alludes to the narrow leaves of this subspecies that distinguish it from the other subspecies.

Boronia Sm. section ***Boronia*** series ***Boronia***

Boronia series *Octarrhena* F.Muell., *Pl. Victoria* 1: 113 (1862). *Lectotype species*: *B. pinnata* Sm., *fide* Wilson, *Nuytsia* 12(1): 121 (1998).

Boronia series *Heterandrae* Benth., *Fl. Austral.* 1: 308, 315 (1863); *B.* section *Heterandrae* (Benth.) Engl., *Nat. Pflanzenfam.* 3(4): 136 (1896). *Lectotype species*: *B. megastigma* Nees *fide* Wilson, *Nuytsia* 12(1): 121 (1998).

Boronia series *Pinnatae* Benth., *Fl. Austral.* 1: 309, 317 (1863); *B.* section *Pinnatae* (Benth.) De Wild., *Icon. Select.* 2: 67 (1901). *Lectotype species*: *B. pinnata* Sm. *fide* Wilson, *Nuytsia* 1: 122 (1971).

Boronia series *Variabilis* Benth., *Fl. Austral.* 1: 309, 320 (1863). *Lectotype species*: *B. crenulata* Sm., *fide* Wilson, *Nuytsia* 12: 122 (1998).

Boronia series *Terminales* Benth., *Fl. Austral.* 1: 310, 323 (1863); *B.* section *Terminales* (Benth.) F.Muell., *Fragm.* 9: 115 (1875). *Lectotype species*: *B. capitata* Benth., *fide* Wilson, *Nuytsia* 12: 122 (1998).

Boronia series *Ovatae* Wilson, *Nuytsia* 1: 204 (1971). Type species: *B. ovata* Lindl.

Leaves simple or imparipinnate. *Inflorescence* terminal or axillary, cymose. *Sepals* imbricate in bud, abaxial surface glabrous or variously hairy, persistent. *Stamens* 8 or 4

(WA); anthers glabrous or with few hairs (*B. serrulata*). *Seed* black or dark brown; hilum sunken, linear to elliptic in centre of adaxial margin; raphe fleshy; hilum and raphe surrounded by labiose raised testa margin; chalazal opening basal (see also Wilson 1998).

Boronia series *Boronia* contains 46 species with 23 confined to the eastern states (SA, Qld, NSW, Vic., Tas.), 22 to south-western Australia and one, *B. inornata*, found in both Western Australia and South Australia (see also discussion under *B. pilosa* subsp. *parvidaemonis*). In the eastern states the series is found from the Bundaberg and Fraser Island areas (Qld), through the coast and tablelands of New South Wales, across Victoria to the Eyre Peninsula and Kangaroo Island (SA) and throughout Tasmania.

12. *Boronia pinnata* Sm., *Tracks nat. hist.* 290, t. 4 (1798); *B. pinnata* Sm. var. *pinnata* Benth., *Fl. Austral.* 1: 319 (1863). *Type citation*: type not cited. [Though specimens were not cited with the description Smith (l.c., p. 290), in the preamble of the paper, states 'Four species only of the genus in question have been hitherto been detected among dried specimens collected near Port-Jackson, by Mr. White'; later Smith (1807, p. 283) cites one specimen 'Gathered near Port Jackson, by Dr. White'.] *Type*: Port Jackson, New South Wales [c. 33°49'S 151°17'E], *Mr White s.n.*, 1795 (lectotype, here designated, LINN *684.1 n.v.* [transparency MEL *2041285*]; isolectotype LIV *n.v.* [photograph CANB]). [Note: see *B. polygalifolia* re. Mr White].

Boronia pinnata var. *alba* Guilfoyle, *Australian Plants* 77 (1911). *Type citation*: (not cited). *Type*: North Shore, *Anon.* (possible syntype MEL *250903* [included with specimen labeled - North Shore, Sydney, *W. Woolls* (MEL *250902*)]). Note: This is the only collection determined as *B. pinnata* var. *alba* that has been located at MEL where Guilfoyle worked. Description decisive.

[*Boronia pinnata* Sm. var. *typica* Domin, *Beitrage zu Flora und Pflanzengeographie* 21: 839 (1926) [= *Bibliotheca Botanica* Heft 89 (1926)], *nom. illeg.*, *autonyme.*]

Illustrations: Smith (*l.c.*); J. Sims, *Curtis's Botanical Magazine* 42: No. 1763 (1815); J.H. Maiden and W.S. Cambell, *Fl. pl. ferns N.S.W.* 5: 61 No. 22 (1897); M.B. Welch and A.R. Penfold, *J. & Proc. Roy. Soc. New South Wales* 5: 200, pl. XIV, Fig. 1 (1921), cross section of leaf; W.R. Elliot and D.L. Jones, *Encyclopedia of Australian Plants* 2nd edn, 347 (1985), photograph; M. Baker, R. Corringham and J. Dark, *Native Plants of the Sydney Region*, 23 (1989), photograph; A. Fairley and P. Moore, *Native Plants of the Sydney District*, 235, pl. 814 (1989), photograph; L. Robinson, *Field Guide to the Native Plants of Sydney*, 116 (1991); P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 234 (1991); P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 274 (2002); R. Spencer, *Horticultural Fl. South East Australia* 4: 10 (2002).

Erect, woody *shrub* to 1.6 m high, glabrous apart from the flowers. *Branchlets* not obviously glandular, slightly to prominently angled, leaf decurrencies indistinct and usually absent on older stems. *Leaves* imparipinnate, (1–)5–13-foliolate, entire leaf in outline 18–60 mm long, 14–54 mm wide, not obviously glandular; petiole 6–17 mm long; rachis segments 3–12 mm long; leaflets 5–29 mm long, 1–3(–7) mm wide, narrow-elliptic or narrow-oblong, concolorous, dorsiventral (illustrated by Welch & Penfold 1921), flat, margins entire, recurved or not, apex acute or mucronate; terminal leaflets longer, shorter or similar to lateral leaflets. *Inflorescence* axillary, occasionally terminal, 3–20(–40)-flowered, shorter to slightly longer than leaves; peduncles 5–20 mm long, secondary inflorescence units 3–11 mm long; prophylls and metaxyphylls 1–2 mm long, simple; anthopodia 6–11(–30) mm long. *Sepals* deltate, 1–1.5 mm long, c. 1 mm wide, not obviously glandular, glabrous or with a few simple hairs at apex. *Petals* bright pink, 5–11.5 mm long, adaxial surface with scattered simple antrorse hairs, abaxial surface glabrous apart from ciliate margin and fine pubescence towards apex and margin, tip slightly subterminally apiculate. *Staminal filaments* densely pilose on margins, glandular tuberculate towards apex, sometimes only slightly; anthers glabrous, not apiculate.

Gynoecium glabrous; stigma entire, minute, barely wider than the style. *Cocci* 4–5 mm long, glabrous. *Seed* black, c. 2 mm long, c. 1 mm wide. n=11 (Smith-White 1954; Stace *et al.* 1993).

Representative specimens (c. 230 specimens examined): **NEW SOUTH WALES**; NORTH COAST: c. 2 km from Wardell on road to Alstonville, just south of Ballina, 28°52'S 153°30'E, *T.A. Halliday 514*, 27.iv.1975 (AD, BRI, HO); Barcoongera, *W. McReadie s.n.*, viii.1964 (NSW *384440*); Red Rock, 29°59'S 153°13'E, *N. Ollerenshaw 81*, 31.viii.1976 (CANB); 1.5 km W of Red Rock, 29°59'S 152°12'E, *D.B. Foreman 951*, 24.viii.1985 (CANB, MEL, NE); 1.2 miles (1.9 km) NW of Hat Head [30 miles (20.9 km) E of Kempsey], 31°04'S 153°03'E, *R. Coveny 4956*, 22.viii.1973 (CANB, NSW); 4 miles (6.4 km) S of Diamond Head Road, 31°42'S 152°47'E, *R. Coveny 4939*, 21.viii.1973 (CANB, NSW); Crowdy Bay, 31°47'S 152°45'E, *M.G. Corrick 5922*, 17.ix.1977 (MEL); 22.6 miles (36.2 km) SW of Bulahdelah on the Pacific Hwy, *R. Coveny 4229 and J.A. Armstrong*, 24.viii.1972 (NSW); CENTRAL COAST: West of Mt White at Greenmans Valley and Neverfail Rd junction, 33°28'S 151°11'E, *R. Coveny 11212, A. Tillsley and B. Wallace*, 10.viii.1982 (CANB, NSW); Near Quarry on the track from Arcadia to Marramarra Ck, 33°34'S 151°04'E, *D.E. Albrecht 2129*, 11.x.1985 (MEL, NSW); Duffus Forest, 9 km W of Mona Vale, Sydney, 33°40'S 151°11'E, *D.H. Benson 1033*, 31.x.1974 (NSW); SOUTH COAST: Turpentine Range, Turpentine Rd, 1 km E of Nerriga-Tomerong turn-off, 35°02'S 150°28'E, *M.D. Crisp 1174*, 20.ix.1975 (CANB); Southern Hutchisson to Braidwood Rd, 30 km W from its crossing by Hwy 1, 35°03'S 150°34'E, *N.G. Walsh 1409*, 26.viii.1984 (CANB, MEL); 21 km from Tomerong on Turpentine Rd, 35°20'S 150°28'E, *F.W. Howe 70*, 12.ix.1983 (CANB, MEL, NSW); 12 miles [c. 19.2 km] from Currarong, towards Nowra Hill, *M.E. Phillips* s.n., 27.viii.1967 (CANB *CBG25192*); **AUSTRALIAN CAPITAL TERRITORY**: Jervis Bay, Australian Botanical Gardens annex, near gate, 35°09'S 150°40'E, *F.W. Howes 51*, 13.ix.1983 (AD, CANB, NSW *n.v.*, PERTH).

Typification: Chapman (1991) lists as a type citation for *B. pinnata* "flowered for the first time in Europe at Messrs. Lee and Kennedy's in the Spring of 1795." In his introduction Smith (1798) discussed the four species of *Boronia* he had seen in the dried collections that Mr White made near Port Jackson (see above) and that *B. pinnata* was the only species, of the four, that had been introduced to horticulture (see also Sims 1815). After he describes *B. pinnata*, Smith states what Chapman cites. It is clear that the four species were described from the dried material collected by Mr White (which have been located, see above and *B. parviflora*, *B. polygalifolia*, and *B. serrulata*). The glasshouse material, though of taxonomic, horticultural and historical interest, may have helped in the formulation of the description but is not the only material that the description was based on. As no specimens of the horticultural material have been found, the lectotype is selected from the White material.

Notes: Mueller (1860-1862; and later in 1879, 1885, 1887-1888, 1889) adopted a very broad concept for *B. pinnata* (akin to his broad concept of *B. polygalifolia*, see above) which included species from *B.* section *Boronia* (viz. *B. pilosa, B. tetrandra* Hook., *B. gunnii, B. citriodora*, as well as specimens of *B. muelleri*), *B.* section *Cyanothamnus* (viz. *B. variabilis* [= *B. anemonifolia* subsp. *variabilis*]), and *B.* section *Valvatae* (viz. *B. anemonifolia* Paxt. [= *B. fraseri*] and *B. fraseri*). He considered these names could only be applied to 'the end forms of a polymorphous species' which he could not segregate. He even considered that *B. algida* F.Muell. (*B.* section *Algidae*) may be an alpine form of *B. pinnata*. As with his very broad, and unnatural, concept of *B. polygalifolia*, his concept of *B. pinnata* was not adopted by other workers.

Bentham (1863) synonymised *B. floribunda* under *B. pinnata* and relegated *B. gunnii* (under which he synonymised *B. citriodora*) to varietal status. He also described *B. pinnata* var. *muelleri* (= *B. muelleri*) which was accepted by Domin (1926). The species called *B. pinnata* by Scortechini (1881) is *B. safrolifera*; by Bailey (1883, 1899, 1911, 1913) is *B. rivularis* and/or *B. safrolifera*; by Tate (1890) is *B. pilosa* subsp. *torquata*; and by FNCV (1923, 1928), Ewart (1931) and Galbraith (1950, 1955, 1967) is *B. latipinna*.

The chemical Rutin, a natural yellow dye also found in *Ruta graveolens* Linn., was extracted from *B. pinnata*, *B. serrulata* and *B. thujona* by Morrison (1921). The volatile

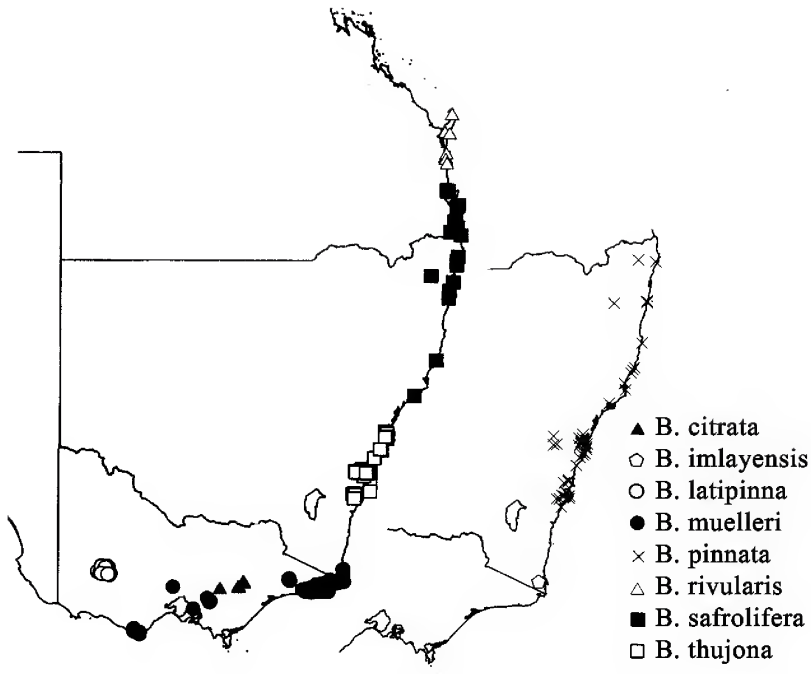

Figure 7. Distribution of *B. citrata*, *B. imlayensis*, *B. latipinna*, *B. muelleri*, *B. pinnata*, *B. thujona*, *B. rivularis*, *B. safrolifera*.

oils limonene, terpene and other terpenes, have been extracted from *B. pinnata* (Penfold 1949). The material of *B. pinnata* from which oil was extracted by Smith (1919) can be assigned to *B. muelleri* (see below; also discussed by Cheel 1924).

Double flowered plants of *B. pinnata* have been collected from Nowra (*Rodway 12865*, NSW), and near Gosford (*Slade RMB1461*, NSW) and have been introduced into cultivation (Elliot & Jones 1982). Slade noted on the collection that there were numerous double flowered plants in the population. *Boronia pinnata* is a popular cut flower with florists (Plummer & Payne 1997). Horticultural forms of the species are discussed by Spencer (2002) and horticultural notes are given by Elliot and Jones (1982).

The species was called the Hawthorn-scented Boronia by Smith (1798) and Sims (1815), the Feather-leaved Boronia by Guilfoyle (1911), and the Pinnate Boronia by Galbraith (1977): these names appear not to be in vernacular use today (see Weston & Porteners 1991; Weston & Duretto 2002). Maiden and Cambell (1898) indicated that the species was called simply "Boronia" or "Pink Boronia" which they considered, and rightly so, not distinctive enough. They suggested that a bold step be taken and the common name of *Boronia pinnata* be adopted.

Distribution and ecology: *Boronia pinnata* grows in dry sclerophyll forest and heath on sandstone in near coastal areas from Milton (NSW) to Jervis Bay (ACT) (Fig. 7). The known distribution, ecology and conservation status of this species in the Central Tablelands and Central Coast areas (NSW) are discussed by Benson and McDougall (2001). *Boronia pinnata* was found to be self-incompatible by Weston *et al.* (1984). Flowering September-January(-April); fruiting September-January.

Myrmecochory has been confirmed for *B. pinnata* (Rice & Westoby 1981; see discussion under *B. parviflora*).

Conservation status: The species is common, widespread and well represented in reserves and is not considered to be under threat (see also Benson & McDougall 2001).

Etymology: *Boronia pinnata* was the only pinnate-leaved *Boronia* described by Smith (1798) and the specific epithet presumably refers to this.

13. *Boronia thujona* Penf. & Welch, *J. & Proc. Roy. Soc. New South Wales* 5: 200 pl. xii-xiv, Figs 2-4 (1922). *Type citation*: "Narrabeen (A.R. Penfold); Middle Harbour, in creek beds and ravines; Bundanoon (C.F. Laseron); Wardell, N.S.W. (Bauerlen)." *Type*: not seen (? NSW); description and figures decisive.

Illustrations: M.B. Welch and A.R. Penfold, *J. & Proc. Roy. Soc. New South Wales* 5: 200 pl. xii-xiv, Figs 2-4 (1922); W.R. Elliot and D.L. Jones, *Encyclopedia of Australian Plants* 2nd edn, 351 (1985); M. Baker, R. Corringham, and J. Dark, *Native Plants of the Upper Blue Mountains*, 41 (1985), photograph; A. Fairley and P. Moore, *Native Plants of the Sydney District*, 235, pl. 815 (1989), photograph; P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 235 (1991); P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 275 (2002).

Erect, woody *shrub* or small *tree*, to 2.5(–4) m high, glabrous apart from inflorescence bracts and flowers. *Branchlets* not obviously glandular, with leaf decurrencies. *Leaves* imparipinnate, 3–15-foliolate, entire leaf in outline 30–80 mm long, 23–70 mm wide; petiole 10–15 mm long; rachis segments 4–8 mm long; terminal leaflets 5–25 mm long, 1–4 mm wide, narrow-elliptic to linear-oblong, discolorous with abaxial surface slightly paler, dorsiventral (illustrated by Welch & Penfold 1921), margins finely glandular-crenate and slightly recurved, apex acute; lateral leaflets similar but usually longer than terminal leaflets, 5–35 mm long, 1–7 mm wide. Inflorescence axillary, (1–)3–15-flowered, shorter to longer than leaves; peduncles 8–15(–30) mm long, secondary inflorescence units 4–15 mm long; prophylls 0.5–3 mm long, simple or rarely minutely pinnate, glabrous to ciliate; metaxyphylls c. 0.5 mm long, glabrous or glabrescent; anthopodia 5–8 mm long. *Sepals* deltate, 0.75–1.5 mm long, 0.5–1 mm wide, not obviously glandular, glabrous though a few simple hairs usually present towards apex, occasionally ciliate, tip acute, with or without small subterminal apiculum. *Petals* bright pink, 5–10 mm long, adaxial surface sparsely pilose, abaxial surface pubescent along margins, tip with small subterminal apiculum. *Staminal filaments* pilose, glandular tuberculate towards apex; anthers glabrous, not apiculate. *Ovary* glabrous; style glabrous or sparsely pilose, sometimes barely fused; stigma entire, minute, not or scarcely wider than style. *Cocci* 3–4 mm long, 2–2.5 mm wide, glabrous. *Seed* black, 2–2.5 mm long, 1–1.5 mm wide. n=11 (Smith-White 1954).

Representative specimens (c. 60 specimens examined): **NEW SOUTH WALES**: NORTH COAST: Katandra Sanctuary, Mona Vale, 33°40'S 151°17'E, *R. Coveny 9695*, 19.x.1977 (NSW); CENTRAL COAST: On the Old Gordon Rd between Ku-ring-gai Chase and French's Forest, 33°45'S 151°13'E, *M. Roberts s.n.*, 13.x.1954 (MEL, NSW); Warumbul Rd, Royal NP, 34°05'S 151°04'E, *R. Coveny 4632, W. Chew and B. Cockayne*, 28.ix.1972 (CANB); 12 km W of Kiama on road to Robertson, 34°40'S 150°43'E, *B. Barnsley 220*, 22.x.1978 (CANB); 4 km along walking track from Riverview Ford to Bundanoon Ck, Moreton NP, 34°41'S 150°19'E, *S.R. Corbett 168*, ix.1987 (NSW); Budderoo NP, 1.15 km at 100 deg. from Budderoo Geodetic Station, 34°42'S 150°38'E, *I. Craford 936*, 12.vii.1988 (CANB, MEL, NSW); SOUTHERN TABLELANDS: 4 km along Folly Point, northern Budawang Range, 35°14'S 150°15'E, *I. Olsen 2260*, 17.viii.1974 (NSW); Little Forest Plateau, 10 km NW of Milton, 35°15'S 150°20'E, *I.R. Telford 3813 and H. Streimann*, 2.x.1974 (CANB, NSW); Creek Reservoir, Tianjara area, 5 km WNW of Porters, 35°16'S 150°18'E, *K. Paijmans 4027*, 20.v.1981 (CANB); South ridge of Pigeon House Mt, 19 km W of Ulladulla, 35°22'S 150°16'E, *I.R. Telford 4131*, 16.xi.1975 (CANB, NSW); Pigeon House Range via Braidwood, *C. Burgess s.n.*, 28.x.1970 (AD, BRI).

Notes: Welch and Penfold (1921) and Penfold (1949) extracted a number of volatile oils, including thujone, from *B. thujona*. The chemical Rutin, a natural yellow dye also

found in *Ruta graveolens*, was extracted from *B. pinnata*, *B. serrulata* and *B. thujona* by Morrison (1921).

In volatile oil studies a 'taxon' called *B. thujona* var. "A" is listed by Penfold (1949). Ghisalberti (1997) states that oil work on this 'taxon' was also done or discussed by Welch and Penfold (1921), White (1942), and Penfold and Morrison (1948). Welch and Penfold (1921) and White (1942) do discuss *B. thujona* but no mention is made of the above variety though Penfold and Morrison (1948) do list a *B. ledifolia* variety "A". This latter variety was collected from the Punchbowl near Grafton and Penfold and Morrison state it had an overpowering aroma. The only species of *Boronia* known from the Punchbowl by the author is *B. chartacea* P.H.Weston, a relative of *B. ledifolia* (see Weston 1990; Duretto 1999b), which has glandular serrate leaves and a very strong odour (pers. obs.). The leaves of *B. thujona* are also serrate. *Boronia thujona* var. "A" differs chemically from *B. thujona* in having large amounts of safrole like *B. safrolifera* (Penfold 1924, 1949; Ghisalberti 1997) which is found on the coast near Grafton. The name *B. thujona* var. "A" cannot be placed confidently with any taxon and may be any of the above mentioned species.

Boronia thujona was called the Bronzy Boronia by Galbraith (1977) who was followed by Elliot and Jones (1982) and Spencer (2002). This name was coined as the leaves sometimes have a bronze sheen (Galbraith 1977); the species is also found near the coast and excellent beaches. Other treatments, including accounts for the *Flora of New South Wales* (Weston & Porteners 1991; Weston & Duretto 2002) and various Sydney regional floras (e.g. Beadle *et al.* 1972, 1982; Baker *et al.* 1985; Caroline & Tindell 1993; Robinson 1991) list no common name for this species. Horticultural notes for *B. thujona* are provided by Elliot and Jones (1982).

Distribution and ecology: *Boronia thujona* is found from the Sydney region to the Budawangs, New South Wales (Fig. 7). It is usually found in damp and shady situations on sandstone, in wet and dry sclerophyll forest. Vesicular-arbuscular mycorrhiza have been recorded for *B. thujona* (Bellgard 1991). The known distribution, ecology and conservation status of this species in the Central Tablelands and Central Coast areas (NSW) are discussed by Benson and McDougall (2001). *Boronia thujona* was found to be self-incompatible by Weston *et al.* (1984). Flowering (July-)August-November; fruiting October-December.

Conservation status: The species is found in a number of reserves (see also Benson & McDougall 2001) and appears to be secure.

Etymology: *Boronia thujona* is named after the ketone, thujone (Welch & Penfold 1922).

14. *Boronia muelleri* (Benth.) Cheel, *J. & Proc. Roy. Soc. New South Wales* 58: 147 (1924); *B. pinnata* var. *muelleri* Benth., *Fl. Austral.* 1: 319 (1863). *Type citation*: "Victoria. Sources of the Bunyip river, in the Grampians, near Portland Bay, and towards the mouth of the Glenelg, F. Mueller." *Type*: Sources of the Bunyip River, Victoria, *Mueller s.n.* (lectotype, here designated, MEL *258534* [seen by Bentham]; isolectotypes MEL *258530* [seen by Bentham], MEL *258531*, MEL *258532*, MEL *258535*); Bunnip [sic] Ck, Victoria, *F. Mueller s.n.* (residual syntypes MEL *258533*, NSW); Bunip-Bunip River [sic], *F. von Mueller s.n.*, i.1858 (residual syntype MEL *239163*); Bunip Bunip Ck [sic] [the collector is presumably F. Mueller given the label is in his handwriting] (residual syntype K *n.v.* [cibachrome MEL *2041273*, photograph AD *99537227*]).

Boronia species (Otways Ranges): W.R. Elliot & D.L. Jones, *Encyclopaedia of Australian Plants* 2, 353 (1982).

["*Boronia pinnata*" *auct. non* Sm.: F. Mueller, *Pl. Victoria* 1: 115 (1860-1862), p.p.; F. Mueller, *Nat. pl. Victoria* 69 (1879), p.p.; F. Mueller, *Key Vict. pl.* 2: 9 (1885), p.p.; F. Mueller, *Key Vict. pl.* 1: 145 (1887-1888), p.p.]

Illustrations: C.E. Rosser, *Wildflowers of Victoria* 53 (1968); J. Galbraith, *Wildflowers Victoria* t. 81 (edn 1, 1950; edn 2, 1955; edn 3, 1967), photographs; J.H. Willis, B.A. Fuhrer, and E.R. Rotherham, *Field Guide to the Flowers and Plants of Victoria* 203 (1975), photograph; L. Costermans, *Native Trees and Shrub of South-Eastern Australia*, 198, 199 (1983), photograph; W.R. Elliot and D.L. Jones, *Encyclopedia of Australian Plants* 2nd edn, 345 (1985); P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 235 (1991); M.F. Duretto, *Fl. Victoria* 4: after p. 532, plate 5b, p. 163, Fig. 29b (1999); M.G. Corrick and B.A. Fuhrer, *Wildflowers of Victoria* 206 (2000), photograph; P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 275 (2002); R. Spencer, *Horticultural Fl. South East Australia* 4: 10 (2002).

Erect, woody *shrub* or small *tree* to 3 m (NSW, Vic.) or to 7 m (Vic.) high. *Branchlets* usually glandular tuberculate, glabrous to sparsely hispidulous between leaf decurrencies, becoming glabrous with age, hairs to 0.1 mm long. *Leaves* imparipinnate, 7–17-foliolate (on one specimen few leaves with lower leaflets ternate), entire leaf in outline 45–70 mm long, 20–45 mm wide, glabrous; petiole 6–12 mm long; rachis segments 4–10 mm long; terminal leaflet 4–24 mm long, 1–3.5 mm wide, narrow-elliptic or oblong, slightly discolorous, abaxial surface paler, dorsiventral, margins finely serrate, +/- glandular tuberculate, apex acute to rounded; lateral leaflets similar to terminal leaflets but usually longer, 5–25 mm long, 1–4.5 mm wide. *Inflorescence* axillary, sometimes terminating short axillary shoots, 1–15-flowered, shorter than or as long as leaves; peduncles 4–15 mm long, glabrous or hispidulous between decurrent bract bases; prophylls and metaxyphylls 1–2 mm long; anthopodia 5–15 mm long. *Sepals* ovate-deltate, 1.5–2 mm long, not obviously glandular, glabrous, tip acute, with subterminal apiculum. Petals pale to deep pink or white, 4.5–7.5 mm long, glabrous or ciliate, tip with subterminal apiculum. *Staminal filaments* pilose, slightly glandular tuberculate towards apex; anthers glabrous, not apiculate. *Gynoecium* glabrous; stigma entire, minute, barely wider than the style, style and stigma together 0.75–1.25 mm long. *Cocci* 3–4 mm long, 1.5–2 mm wide, glabrous. *Seed* black, 1.5–3 mm long, 1–1.5 mm wide. n=11 (Stace & Armstrong 1992; Stace *et al.* 1993). **Forest Boronia, Pink Boronia.**

Selected specimens (c. 60 specimens examined): **NEW SOUTH WALES**; SOUTH COAST: Sugarloaf, *J. Saunders 5* (NSW); Duckhole Rd, c. 0.5 km S of its intersection with the final 5 km track to Saltwater Ck camping ground, 37°11'S 149°57'E, *D.E. Albrecht 774*, 18.ix.1984 (CANB, MEL); Nadgee Nature Reserve, Newtone Beach, 37°22'S 149°57'E, *D.E. Albrecht 1523*, 22.i.1985 (MEL, NSW); vicinity of Mt Victoria trig, Howe Range, 37°28'S 149°52'E, *D.E. Albrecht 1043*, 28.ix.1984 (MEL, NSW); **VICTORIA**; EAST GIPPSLAND: Allen Head, Genoa River, Bottom Lake, 37°31'S 149°48'E, *D.E. Albrecht 4834*, 20.x.1991 (CANB, HO, MEL, NSW); Genoa Gorge, c. 9 km NW of Genoa township, *J.H. Willis s.n.*, 23.x.1948 (MEL *2099489*); E side of Buckland Rd, 20 km SE of Princess Hwy (Howe Range, E of Mallacoota), 37°27'S 149°50'E, *P.C. Jobson 4176*, 1.iii.1996 (BRI, CANB, MEL); Croajingalong NP, Karbeethong Rd, 5 km NW of Mallacoota on Mallacoota-Genoa Rd, 1 km E of turn-off, 37°32'S 149°44'E, *J. Ross 3509*, 21.x.1991 (AD, BRI, CANB, HO, MEL, NSW); Lake Elusive track, 0.7 km SW of West Wingan Rd, 3.2 km W of Wingan Inlet, 37°45'S 149°28'E, *N.G. Walsh 147*, 3.vi.1979 (MEL); Seismic track/61 Fire Trail extension at Tamboon Inlet, c. 2.5 km WSW of Tamboon, 37°45'S 149°07'E, *G. Lucas 97*, 19.ix.1985 (MEL); Wingan Inlet NP, the Rapids, west side of Wingan River, Z42, *A.C. Beauglehole 31925 and E.W. Finck*, 21.xi.1969 (MEL); EASTERN HIGHLANDS: Wildflower reserve 9.1 km N of Labertouche, 38°00'S 145°49'E, *P.G. Neish 364*, 20.viii.1997 (MEL); Upper part of Rysons Ck, N of Labertouche, *D.J. McGillivray 3204 and C. Bartlett*, 20.xi.1973 (MEL, NSW); MIDLANDS: Pyrite SF, Hobbs Rd c. 1.2 km from junction with Melton-Gisbourne Rd, 37°31'S 144°33'E, *V. Stajsic 2864*, 19.xi.2000 (AD, HO, CANB, MEL, NSW); OTWAY RANGE: N side of Great Ocean Rd, 150 m E of Sandy Ridge track, Otway NP, 38°46'S 143°33'E, *K. Macfarlane 187*, 10.x.1996 (MEL); Ford Ck track, Aire Valley, Otways, 38°46'S 143°26'E, *G. E. Earl 200*, 11.v.1983 (MEL); 4 miles [c. 6.4 km] S of Lavers Hill on road to Glen Aire, c. 10 miles [c. 16 km] NW of Cape Otway, *B. G. Briggs 2962*, 23.x.1969 (MEL, NSW).

Notes: Bentham (1863) included plants of *B. latipinna* (from the Grampians) and Domin (1926) included material of *B. rivularis* in their concepts of *B. pinnata* var.

muelleri. Volatile oils, e.g. elemicin, have been extracted from *B. muelleri* (Smith 1919, listed as *B. pinnata*; Penfold 1949). Albrecht and Walsh (1993) noted that a specimen from Genoa Gorge (viz. *Willis s.n.*, MEL *2099489*) differed from other specimens in having narrowly oblanceolate leaflets as opposed to narrowly elliptic. Other collections in East Gippsland have mostly narrowly elliptic leaflets though some leaflets may be narrowly oblanceolate.

Boronia muelleri is popular in the horticultural trade and a number of cultivars, e.g. 'Sunset Serenade', are available (Elliot & Jones 1982; Plummer & Payne 1997; Spencer 2002). Horticultural notes are provided by Elliot and Jones (1982).

Distribution and ecology: *Boronia muelleri* is naturally found south from Eden (NSW) to the Victorian border, and west to Orbost, in the Bunyip River and Buchan areas, near Gisbourne, north-west of Melbourne, and in the Otway Range (Vic.) (Fig. 7). The species is usually found on moist sandy soil in *Eucalyptus* or *Banksia* forest or woodland, or heath. *Boronia muelleri* has sporadically become naturalised in the greater Melbourne area (e.g. Cranbourne South, *Paget 2699*, 14.xii.1996, MEL). It is not known whether the recently discovered population from near Gisbourne (*Stajsic 2864*), which consists of c. 20 plants (Stajsic MEL, pers com. 2002), is part of the indigenous or naturalised flora of the area. Flowering October-February(-March-June); fruiting October-December.

Conservation status: The species is common, widespread, found in a number of reserves throughout its range, and probably secure.

Etymology: The species is named for Ferdinand Mueller (Bentham 1863).

15. *Boronia imlayensis* Duretto, *sp. nov.*

A *Boronia muelleri* Benth. foliis minoribus, pedunculis brevioribus et caulibus pubescentibus differt.

Type: NEW SOUTH WALES: SOUTH COAST: Mt Imlay ridge top, 37°11'S 149°45'E, *M.F. Duretto 715*, 2.xi.1995 (holotype MEL *2046130*; isotypes AD, BRI, CANB, HO, K, MEL *2046131*, NSW). (Figs 6 F-G).

Illustration: P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 275 (2002).

Erect, woody *shrub* to 1 m high. *Branchlets* glandular tuberculate, pubescent, hair density greater between leaf decurrencies, becoming glabrous with age, hairs to 0.25 mm long. *Leaves* imparipinnate, 7–13-foliolate, entire leaf in outline 16–29 mm long, 13–30 mm wide, often glandular tuberculate, especially petiole and rachis segments, hispidulous on petiole and rachis segments, hairs concentrated on adaxial surface, margins and nodes, and usually on the proximal portion of the lower leaflets; petiole 4–8 mm long; rachis segments 2–5.5 mm long; terminal leaflets 3.5–10 mm long, 1.5–4 mm wide, elliptic to narrowly elliptic or oblong to narrowly oblong, slightly discolorous, abaxial surface paler, dorsiventral, margins finely serrate, flat, apex acute to obtuse; lateral leaflets similar to but longer than terminal leaflets, 4–16 mm long, 1–4 mm wide. *Inflorescence* axillary, (1–)3–9-flowered, usually longer than leaves; peduncles 2–9 mm long, hispidulous, at least between the decurrent bract bases, secondary inflorescence units 4–5 mm long; prophylls and metaxyphylls to 1 mm long, persistent; anthopodia 5–10 mm long. *Sepals* deltate, 1–1.5 mm long, c. 1 mm wide, slightly glandular tuberculate, ciliate if only minutely and then with few hairs or glabrous, tip acute, with or without small subterminal apiculum. *Petals* pale to deep pink or white, 5–7.5 mm long, adaxial surface sparsely pilose in distal half, abaxial surface glabrous, ciliate, tip with small subterminal apiculum. *Staminal filaments* pilose, glandular tuberculate towards apex; anthers glabrous, not apiculate. *Gynoecium* glabrous; stigma entire, minute, barely wider than the style, style and stigma together 0.5–0.6 mm long. *Cocci* 3–4 mm long, 1–2 mm wide, glabrous apart from simple hairs along suture. *Seed* (mature seed not seen) black to very dark red-brown, c. 2 mm long, c. 1–1.5 mm wide.

Additional specimens examined: **NEW SOUTH WALES**: SOUTH COAST: Mt Imlay ridge top, 37°11'S 149°45'E, *M.F. Duretto 716–719*, 2.xi.1995 (MEL); Summit of Mt Imlay, 37°10'S 149°44'E, *K.L. Wilson 7873*, 29.iv.1991 (MEL, NSW); *ibid*, 37°11'S 149°44'E, *D.E. Albrecht 193 and B. Conn*, 21.ii.1984 (CANB *n.v.*, MEL, NSW *n.v.*); Mt Imlay, 37°11'S 149°44'E, *M.G. Corrick 6045*, 24.ix.1978 (MEL); Mt Imlay, anon (ex herb. F.A. Rodway No. *1042*), 20.iii.1937 (MEL, NSW); Mt Imlay, near Eden, *J.L. Boorman s.n.*, 1916 (MEL *1058138*, NSW).

Notes: *Boronia imlayensis* has previously been included in *B. muelleri* (e.g. Weston & Porteners 1991) from which it can be distinguished by the smaller leaves (16–29 mm long, 13–30 mm wide; cf. 45–70 mm long, 20–45 mm wide), peduncles (2–9 mm long; cf. 4–15 mm long) and sepals (1–1.5 mm long; cf. 1.5–2 mm long) and pubescent stems (cf. glabrous to sparsely hispidulous between leaf decurrencies).

Distribution and ecology: The species appears to be restricted to the ridge pointing approximately north from the summit of Mt Imlay (Fig. 7) in *Eucalyptus sieberi* L.A.S.Johnson open forest on sandstone. On the ridgetop the species dominates the understorey and plants are also scattered on the upper slopes. Flowering September-November(-March-April); fruiting material has been collected in December.

Conservation status: The species is apparently confined to and near the topmost ridge of Mt Imlay, which is in a national park. The only known population is bisected by a walking track to the summit. Any development plans on the summit or ridge and/or increased bushwalking activity would threaten the species. A conservation code of 2VC-t is appropriate. *Eucalyptus imlayensis* Crisp & Brooker is also known from a single population on Mt Imlay (Hill 1991).

Etymology: The epithet refers to Mt Imlay, to which the species is confined.

16. *Boronia latipinna* J.H.Willis, *Vict. Nat.* 73: 192 (1957). *Type citation*: "VICTORIA (occidentalis - "Summit of Mt. William", in montibus Grampians (HOLOTYPUS in Herb. MEL-H.B. Williamson, 9 Nov. 1900)." *Type*: VICTORIA: GRAMPIANS: Summit of Mt William, *H.B. Williamson s.n.*, 9.xi.1900 (holotype MEL *225626*; probable isotype NSW *385900* [this specimen is dated xi.1900]).

["*Boronia pinnata*" *auct. non* Sm.: FNCV, *A census of the plants of Victoria* 39 (1923, 1928); A.J. Ewart, *Fl. Victoria* 700 (1931)]

Illustrations: A.J. Ewart, *Flora of Victoria* 701 (1931), as *B. pinnata*; J. Galbraith, *Australian Plants* 11, 293 (1982), photograph; I.R. McCann, *The Grampians in Flower*, 99 (1994), photograph; M.F. Duretto, *Fl. Victoria* 4: 163, Fig. 29c (1999); M.G. Corrick and B.A. Fuhrer, *Wildflowers of Victoria* 206 (2000), photograph.

Erect, woody *shrub* to 2.5 m high, glabrous apart from flowers. *Branchlets* not obviously glandular, leaf decurrencies barely present. *Leaves* imparipinnate, (1–)5–9-foliolate, entire leaf in outline 20–55 mm long and wide, not obviously glandular; petiole 6–18 mm long; rachis segments 3–14 mm long, winged; terminal leaflets 4–27 mm long, 2–8 mm wide, elliptic to slightly lanceolate or obovate, slightly discolorous, abaxial surface paler, dorsiventral, margins ± smooth or barely serrate, apex acute to rounded, sometimes mucronate; lateral leaflets similar to terminal leaflets but usually longer, 6–32 mm long, 2–8 mm wide. *Inflorescence* axillary or sometimes terminal, 3–25^{+}-flowered, shorter or longer than leaves; peduncles, secondary inflorescence units and anthopodia 5–13 mm long; prophylls and metaxyphylls 0.5–3 mm long. *Sepals* ovate-deltate, 1–1.5 mm long and wide, not obviously glandular, glabrous, tip acute. *Petals* pink or white, 6–8.5 mm long, adaxial surface sparsely pilose, abaxial surface glabrous or with few hairs near margin, tip with subterminal apiculum. *Staminal filaments* sparsely pilose, glandular tuberculate towards apex; anthers glabrous, not apiculate. *Ovary* glabrous; style glabrous or sparsely pilose; stigma entire, minute, scarcely wider than style. *Cocci* 4–5 mm long, 2–2.5 mm wide, glabrous. *Seed* black, 3–4 mm long, 1–1.5 mm wide. **Grampians Boronia.**

Representative specimens (c. 30 specimens examined): **VICTORIA**: GRAMPIANS: Victoria Range, Mt Thackery, *A.C. Beauglehole 30347*, 26.i.1969 (MEL); Mt Thackery, Reads Lookout, *A.C. Beauglehole 15999*, 14.x.1950 (MEL); Victoria Range, along track to Mt Thackery, 37°18'S 142°20'E, D17, *M.G. Corrick 10113 and D.B. Foreman*, 2.xii.1986 (CANB, MEL); Victoria Range, N of Castle Rock, D17, *A.C. Beauglehole 4654 and P.E. Finck*, 16.iii.1957 (MEL); Wallaby Rocks Rd, near lookout point at northernmost point on road, 37°06'S 142°20'E, *M.G. Corrick 6799*, 5.x.1980 (MEL); Asses Ears at lookout, *A.C. Beauglehole 25170*, 14.v.1968 (MEL); Track from Sundial Turntable to the Pinnacle, 37°09'S 142°30'E, *P.G. Abell 475 and C. Herscovitch*, 14.xii.1986 (MEL, NSW); Silverband Rd, *M.E. Phillips s.n.*, 30.x.1960 (CANB); Western slope of Boronia Peak, *T.B. Muir 820*, 25.ix.1959 (AD, CANB, MEL); Halls Ck, Wonderland Range, 37°10'S 142°30'E, *P. Collier 2865*, 3.x.1987 (HO); Mt Rosea, *H.G. Ashby 8071*, 28.xi.1944 (AD); Mt Difficult Rd, *A.M. Ashby 1716* (AD); Mt William, 5000', *F. Mueller* (TCD).

Notes: Material of *B. latipinna* has been placed in *B. pinnata* (e.g. FNCV 1923, 1928; Ewart 1931; Galbraith 1950, 1955, 1967) and *B. pinnata* var. *muelleri* (e.g. Bentham 1863). It is distinguished from both these species by the relatively wide leaflets and also from *B. muelleri* by the eglandular branches.

Galbraith (1971) appeared to be the first to coin the common name of Grampians Boronia for this species; she also suggested Winged Boronia. Horticultural notes for *B. latipinna* are given by Elliot and Jones (1982).

Distribution and ecology: The species is restricted to the Grampian Ranges, western Victoria (Fig. 7), where it is not common. It is found in forest, woodland and heath on sandstone derived soils. Flowering August-December; fruiting November-January.

Conservation status: All known populations of this species are found within Grampians National Park and are probably secure: a conservation code of 2RC-t is appropriate (Leigh *et al.* 1981; Briggs & Leigh 1988, 1996; Gullen *et al.* 1990; Walter & Gillett 1997; Ross 2000).

Etymology: The specific epithet is derived from the Latin, *latus* (broad, wide) and *pinna* (leaflet) and alludes to the wide leaflets of the species as when compared with *B. pinnata*.

17. *Boronia safrolifera* Cheel, *J. & Proc. Roy. Soc. New South Wales* 58: 146 (1924). *Type citation*: "In peaty bogs at Coff's Harbour (J.L. Boorman, June, 1911); Broadwater, Richmond River (E. Cheel, Dr. T. Guthrie and A.D. Olle, September, 1916)." *Type*: Broadwater, Richmond River [29°01'S 153°25'E, New South Wales], *E. Cheel s.n.*, xi.1916 (lectotype, here designated, [2 sheets] NSW *385291*, NSW *385292*; Coffs Harbor [30°18'S 153°07'E, New South Wales], *J.L. Boorman s.n.*, vi.1911 (residual syntype NSW *3845290*).

[*Boronia pinnata* var. *alba* Bailey, *Queensland Agric. J.* 27: 250 (Nov. 1911), *nom illeg., non* Guilfoyle (Jan. 1911); *B. safrolifera* var. *alba* C.T.White *sensu* Stanley and Ross, *Fl. South East Queensland* 1: 452 (1983), *nom. illeg.*, manuscript name only (see *Notes* below). *Type citation*: "... met with on the Islands of Moreton Bay by Mr. H. Tryon." *Type*: not seen. Equated with *B. safrolifera* by Stanley and Ross, *Fl. South East Queensland* 1: 452 (1983).]

["*Boronia pinnata*" *auct. non* Sm.: F.M. Bailey, *Queensl. Fl.* 1: 187 (1889), p.p.; F.M. Bailey, *Compr. cat. Queensl. pl.* 73 (1913), p.p.]

Illustrations: B.A. Lebler, *Queensland Agric. J.* 98: 198 (1972); B.A. Lebler, *Wildflowers of South East Queensland* 1: 27 (1977); K.A.W. Williams, *Native Plants Queensland* 1: 37 (1980), photograph; P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 234 (1991); P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 274 (2002).

Erect, woody *shrub* to 2.5 m high, will resprout from a rootstock (see also Auld 2001). *Branchlets* terete to slightly quadrangular, not obviously glandular, glabrescent or

sparsely to moderately pilose, sometimes between leaf decurrencies only, becoming glabrous with age, hairs to 0.5 mm long. *Leaves* imparipinnate, (3–)7–19-foliolate, entire leaf in outline 12–47 mm long, 14–35 mm wide, not obviously glandular, glabrescent to hispidulous, usually denser on proximal portion of leaves; petiole 3–11 mm long; rachis often curved, rachis segments winged though often barely, 2–8 mm long, 0.5–1 mm wide; terminal leaflets 2.5–7(–10) mm long, 1–2(–6, *Sheringham s.n.*, NSW *285213*, see *Notes*) mm wide, linear-elliptic to narrowly obovate or obovate, slightly discolorous, abaxial surface paler, dorsiventral, flat or margins slightly recurved, margins entire or slightly toothed, apex acute to obtuse, mucronate; lateral leaflets similar to terminal leaflets but longer, 5–18 mm long, 1–3.5(–6, *Sheringham s.n.*, NSW *285213*, see *Notes*) mm wide. *Inflorescence* terminal and axillary, (1–)3–12-flowered, scattered along branches, up to as long as leaves, usually compact, glabrous or glabrescent or sparsely to moderately pilose; peduncles 1–5(–20) mm long; secondary and tertiary peduncles 1–6(–10) mm long; prophylls 0.5–2(–7) mm long, awl shaped; metaxyphylls 0.5–1 mm long; anthopodium 2–4 mm long. *Sepals* deltate, 1–1.5 mm long and wide, glabrous, tip acute, with or without small subterminal apiculum. *Petals* white to pink, 4.5–7 mm long, adaxial surface sparsely pilose (sometimes only towards apex), abaxial surface usually minutely pubescent near margins, ciliate, rarely glabrous, tip with a sometimes small subterminal apiculum. *Staminal filaments* pilose along margins, glandular tuberculate towards apex; anthers glabrous, not apiculate. *Ovary* glabrous or with few hairs along suture; style glabrous to sparsely pilose; stigma entire, minute, scarcely wider than style. *Cocci* 3–4.5 mm long, 2–2.5 mm wide, glabrous or glabrescent with a few hairs present along suture. *Seed* black, 2–3 mm long, 1–1.5 mm wide. **Safrole Boronia**.

Representative specimens (c. 60 specimens examined): **QUEENSLAND**: MORETON: Toorbul Point, 2 miles [c. 3.2 km] from the western end of the Bribie Is. Bridge, c. 27°02'S 153°05'E, *K. Williams s.n.*, 4.x.1970 (BRI, CANB, MEL); Stradbroke Is., 2 miles [c. 3.2 km] N of Dunwich, towards Amity Point, *J.P. Baker 211*, 20.viii.1971 (CANB); between Myora and Point Lookout, North Stradbroke Is., *R. Coveny 2031*, 30.viii.1969 (BRI, NSW); Pine Ridge Rd Reserve about 5 miles [c. 8 km] N of Southport, 27°53'S 153°23'E, *B. Lebler and P. Baxter s.n.*, 6.viii.1968 (BRI); **NEW SOUTH WALES**: NORTH COAST: 3 km S Cudgen, 28°17'S 153°33'E, *A.R. Bean 7980*, 16.x.1994 (BRI, MEL); Meerschaum Vale, Lumley's Lane, 28°53'S 153°28'E, *I. Southwell 84–018*, 18.ix.1984 (CANB); between the Bald Knob and Lake Arragon, S of Yamba, *D.J. McGillivray 2367*, 18.viii.1966 (NSW); 1.7 miles [c. 2.7 km] NNW of Broomshead (10 miles [c. 16.1 km] SE of Maclean), 29°35'S 153°19'E, *R. Coveny 4279 and J. Armstrong*, 27.viii.1972 (CANB, NSW); Redbank River, Coriadi, *J. Richards s.n.*, 27.ix.1944 (NSW *385286*); Nelson Bay, *G.M. Lithgow 184*, 27.vii.1965 (NSW); Pindimar, Port Stephens, 32°40'S 152°07'E, *T. Zoete s.n.*, x.1989 (BRI).

Notes: *Boronia pinnata* var. *alba* Bailey was based on material from Stradbroke Island and though type material has not been seen by the author it can safely be assumed it was based on material of *B. safrolifera*, the only member of the *B. pinnata* group found on the island. Bailey's (1883, 1899, 1911, 1913) concept of *B. pinnata* included the yet to be described *B. safrolifera* and *B. rivularis*. Stanley and Ross (1983) cited *B. safrolifera* var. *alba* C.T.White in synonymy under *B. safrolifera*. In the *B. safrolifera* folder at BRI is a handwritten discussion on *B. safrolifera* (photocopies in Library, MEL) in White's handwriting (P. Forster, BRI, pers. com. 2001) in which a proposed new combination, *B. safrolifera* var. *alba*, is made with *B. pinnata* var. *alba* Bailey in synonymy. No other reference to this name has been found in the literature and it would appear to be a manuscript name only. *Boronia safrolifera* can be distinguished from *B. rivularis*, *B. pinnata* and *B. thujona* by the hairy stems (cf. glabrous).

The volatile oils of *B. safrolifera* were extracted and discussed by Penfold (1924, 1949) who confirmed the presence of safrol, a phenol ether, in quantity.

A specimen from Little Shelley Beach, south of Angourie (NC, NSW, *Sheringham s.n.*, NSW *285213*) has very wide leaflets (to 6 mm wide) which is twice that of other

plants seen. The population requires research to ascertain whether this variation is uniform in the population and if it requires taxonomic recognition.

Boronia safrolifera is not common in cultivation and horticultural notes are given by Elliot and Jones (1982). Galbraith (1977) called this species the Coast Boronia.

Distribution and ecology: *Boronia safrolifera* is found in coastal areas from Bribie Island (Qld) to Port Stephens (NSW) (Fig. 7). It inhabits swampy or poorly drained low heath or wallum and Banksia woodland on siliceous sand. The species was found to be self-incompatible by Weston *et al.* (1984). Flowering (April-)August-October(-December); fruiting material has been collected in September and October.

Conservation status: The species is common, widespread and found in various reserves and is not considered to be under threat.

Etymology: Both the scientific and vernacular names are derived from the odour of the crushed leaves that apparently resembles safrole (Cheel 1924; Penfold 1924).

18. *Boronia rivularis* C.T.White, *Proc. Roy. Soc. Queensland* 53: 206 (1942). *Type citation*: "Queensland. - Wide Bay District, Fraser Island, in damp gullies, C.T. White, no. 2505 (type: flowers), May, 1925..." *Type*: QUEENSLAND: WIDE BAY: Fraser Is., in damp gullies, *C.T. White 2505*, v.1925 (holotype BRI *AQ151279* [transparency MEL *2068543*]).

["*Boronia pinnata*" *auct. non* Sm.: F.M. Bailey, *Queensl. fl.* 1: 187 (1889), p.p.; F.M. Bailey, *Compr. cat. Queensl. pl.* 73 (1913), p.p.]

Illustrations: B.A. Lebler, *Queensland Agric. J.* 98; 196 (1972); B.A. Lebler, *Wildflowers of South East Queensland* 1: 26 (1977); K.A.W. Williams, *Native Plants Queensland* 1: 37 (1980), photograph; W.R. Elliot and D.L. Jones, *Encyclopedia of Australian Plants* 2nd edn, 349 (1985); T.D. Stanley and E.M. Ross, *Fl. South East Queensland* 1: 451, Fig. 69i (1983).

Erect, woody, *shrub* to 2(–4.5, *fide* Lebler 1972, 1977) m high, glabrous apart from flowers. *Branchlets* terete to slightly quadrangular, smooth, not obviously glandular, without leaf decurrencies; branch tips arching downward (*fide* Lebler 1972, 1977). *Leaves* imparipinnate, 3–13(–17)-foliolate, entire leaf in outline 17–68 mm long, 15–64 mm wide, not obviously glandular; petiole 5–15 mm long; rachis segments 5–10 mm long, 0.5–1.5 mm wide; leaflets elliptic to narrow-elliptic, slightly discolorous, abaxial surface paler, flat or margins slightly recurved, margins entire or slightly crenate, minutely serrate, apex acute; terminal leaflets longer, shorter or equal to lateral leaflets, (2–)4–32 mm long, 1–5(–9.5) mm wide. *Inflorescence* terminal and axillary, (1–)3–9-flowered, usually longer than leaves; peduncles 5–17 mm long, thin, secondary and tertiary peduncles 2–15 mm long, thin; prophylls 2–10 mm long, awl shaped or leaf like and pinnate; metaxyphylls 0.5–1 mm long, awl shaped; anthopodium 3–13 mm long. *Sepals* deltate, 0.6–0.8(–1) mm long and wide, not obviously glandular, glabrous or minutely ciliate, tip acute, without or with a minute subterminal apiculum. *Petals* white to pink, 5–8 mm long, adaxial surface sparsely pilose, sometimes only towards apex, abaxial surface glabrous, tip with a sometimes small subterminal apiculum. *Staminal filaments* pilose along margins, glandular tuberculate towards apex; anthers glabrous, apiculum minute or absent. *Ovary* glabrous; style glabrous or sparsely pilose; stigma entire, minute, scarcely wider than style. *Cocci* 3–4.5 mm long, 2–2.5 mm wide, glabrous. *Seed* black, 2–3 mm long, 1–1.5 mm wide. **Wide Bay Boronia.**

Representative specimens (c. 40 specimens examined): **QUEENSLAND**; WIDE BAY: Beside walking track from Ocean Lake to northern tip of island, "Sandy Cape", 1 km S from Lake Woonjeel, Fraser Is., 24°52'S 153°14'E, *N.G. Walsh 1395*, 22.viii.1984 (MEL); Kingfisher Bay resort, W coast of Fraser Is., 25°23'S 153°01'E, *A.R. Bean 8100*, 24.xi.1994 (BRI, MEL, NSW); Fraser Is., near Lake Wabby, *S.T. Blake 14389*, 24.viii.1941 (BRI); Seary's Ck area, N end of Cooloola sandhills, *R.F. Thorne 21333, T. Coaldrake and W. Ridley*, 18.v.1959 (CANB); Upper

Noosa River at junction with Teewah Ck, 39 km ENE of Gympie, 26°05'S 153°02'E, *I.R. Telford 3779*, 1.viii.1974 (CANB, NSW); Upper Noosa River, 27 km N of Tewantin, 26°09'S 153°03'E, *I.R. Telford 4361*, 1.viii.1996 (CANB); Swamp 1 km W of Teewah, c. 16 km N of Noosa, 26°16'S 153°05'E, *P.R. Sharpe 3270*, 1.xii.1982 (BRI, CANB).

Notes: The leaves of *B. rivularis* reportedly smell like sarsaparilla (Lebler 1972, 1977; Stanley & Ross 1983). Material of *B. rivularis*, along with that of *B. safrolifera*, was included in *B. pinnata* by Bailey (1889), and in *B. pinnata* var. *muelleri* by Domin (1926). Lebler (1972, 1977) noted that the tops of the branches arch downwards. This distinctive feature along with the small sepals and the inflorescence being longer than the leaves distinguish *B. rivularis* from *B. safrolifera* (which also has hairy stems), *B. pinnata*, *B. latipinna* and *B. thujona*.

Boronia rivularis is not common in cultivation but apparently gaining favour; horticultural notes are given by Elliot and Jones (1982).

Distribution and ecology: The species is found on Fraser Island and the Cooloola sand mass (Fig. 7). It is usually found in sheltered positions in moist or swampy areas in heath, open *Banksia* or *Eucalyptus* or *Syncarpia* woodland or open forest. Flowering and fruiting September-December(-August).

Conservation status: Though restricted in range, *B. rivularis* is probably not under threat and is found in a number of large National Parks, e.g. Great Sandy and Cooloola. Surveys are required to ascertain the size and extent of populations. A conservation code of 3RC- is appropriate (Hartley & Leigh 1979; Leigh *et al.* 1981; Thomas & McDonald 1987, 1989; Briggs & Leigh 1988, 1996; Walter & Gillett 1997).

Etymology: The specific epithet is derived from the Latin, *rivulus* (channel or small stream), as the species was first discovered in damp gullies on Fraser Island (Lebler 1972, 1977).

19. *Boronia floribunda* Sieber ex Rchb., *Iconogr. bot. exot.* 1: 52, t. 71 (1825). *Type citation*: "Habitat in Nova Hollandia, in montium caeruleorum rupibus arenariis, 8 milliariis anglicic ultra Springwood, in via inter Sydney et Bathurst. Floret ibi Octobri (nobis Aprili). ... Sieb. Fl. Nov. Holland. exsicc. No. 300." *Type*: Nov. Holl., Port Jackson [New South Wales], *Sieber 300* (lectotype, here designated, K *n.v.* [cibachrome MEL *2041267*, photograph AD 99548080]; isolectotypes MEL *250925*, MEL *251027*, MEL *251032* [ex museo bot. Berlin], MEL *262739*; probable isolectotype MEL *251028* [left hand specimen, notes suggest a mixed collection of *Sieber 300* and *Sieber 533*]).

[*Boronia floribunda* Sieber ex Sprengel, *Syst. veg.* 4 (1827), *nom illeg. Type citation*: "Nov. Holl." *Type*: Nov. Holl., Port Jackson [New South Wales], *Sieber 300* (syntype K *n.v.* [cibachrome MEL *2041267*, photograph AD *99548080*]; isosyntype MEL *250925*, MEL *251032* [ex museo bot. Berlin], MEL *251027*; probable isosyntype MEL *251028* [left hand specimen, notes suggest a mixed collection of *Sieber 300* and *Sieber 533*])]

Illustrations: Reichenbach (*l.c.*); M. Baker, R. Corringham and J. Dark, *Native Plants of the Upper Blue Mountains*, 33 (1985), photograph; M. Baker, R. Corringham and J. Dark, *Native Plants of the Sydney Region*, 117 (1989), photograph; A. Fairley and P. Moore, *Native Plants of the Sydney District*, 235, pl. 812 (1989), photograph; L. Robinson, *Field Guide to the Native Plants of Sydney*, 115 (1991); P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 235, 236 (1991); P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 276 (2002).

Erect, woody *shrub* to 1 m high, glabrous apart from flowers. *Branchlets* slightly quadrangular, not obviously glandular, leaf decurrencies present. *Leaves* imparipinnate, (3–)5–9(–15)-foliolate, entire leaf in outline 13–35(–50) mm long, (6–)15–28 mm wide, not obviously glandular; petiole 3–7(–11) mm long; rachis segments winged, 2–7 mm long; leaflets (1–)4–11(–25) mm long, 1–4 mm wide, narrow-elliptic, narrow-oblong or narrow-obovate, thick, ± glandular tuberculate, slightly discolorous, abaxial surface

paler, dorsiventral, flat or margins recurved, margins entire, minutely serrate or rarely serrate, apex acute and mucronate; terminal leaves shorter to longer than lateral leaflets. *Inflorescence* axillary, scattered along branches, rarely terminating short axillary shoots, 1–9-flowered, as long as or longer than leaves; peduncles and anthopodia 3–8 mm long; prophylls 1–2.5 mm long; metaxyphylls 1–1.5 mm long. *Sepals* deltate, 2.5–3.5 mm long, 1–2 mm wide, not obviously glandular, glabrous, tip appearing acuminate due to involute margins. *Petals* white to pink, 6–15 mm long, glabrous, tip with a subterminal apiculum. *Staminal filaments* pilose with a dense tuft of hairs on the glandular tips, these tufts of hairs forming a distinct raised ring when flower viewed from above; anthers glabrous, with an erect apiculum or not apiculate. *Gynoecium* glabrous; style vestigial, concealed by stigma; stigma entire, massively swollen. *Cocci* 3–5 mm long, 2.5–3 mm wide, glabrous. *Seed* black to black-tan, c. 2.5 mm long, c. 1.5 mm wide. n=11 (Smith-White 1954; Stace *et al.* 1993). **Pale Pink Boronia**.

Representative specimens (c. 70 specimens examined): **NEW SOUTH WALES**: CENTRAL TABLELANDS: Kekeelbon Mtns - 2 miles [c. 3.2 km] SE of 'Three Ways' along Putty Fire Trail, *T. and J. Whaite 3281*, 1.ix.1969 (NSW); 3.2 km ESE of Mt Coricudgy, E of Rylstone, 32°51'S 150°23'E, *I.R. Telford 5080 and G. Butler*, 27.x.1976 (CANB); 16.5 km along the army road towards Gospers Mtn, 32°55'S 150°21'E, *F.E. Davies 1648, G. Butler and G. Corsini*, 10.xii.1991 (CANB, NSW, PERTH); Cyril's Rock, 11 miles [c. 17.6 km] N of Gosper's Mtn army airstrip (9 miles [c. 14.4 km] NE of Glen Davis) on military road, *A.N. Rodd and D.J. McGillivray s.n.*, 26.iv.1965 (NSW *385844*); Blue Mountains, Tesselate Hill, 4 km (direct) NNE of southern highest point of Mt Irvine, 33°27'S 150°28'E, *F.E. Davies 1849, G.A. Corsini and M. Wheatley*, 15.x.1996 (MEL); Du Fours Rock, Mount Wilson, Chinamans Hat walking trail, 33°31'S 150°22'E, *P. Beesley 217, S. Donaldson and P. Ollerenshaw*, 21.xi.1984 (CANB, MEL); Pulpit Lookout, Blue Mountains, 33°37'S 150°19'E, *M.I.H. Brooker 4323*, 17.xii.1973 (NSW); "Little Switzerland", 3.2 km SSE of Wentworth Falls railway station, 33°44'S 150°22'E, *R.G. Coveny 15907 and McCune*, 6.xi.1991 (CANB, NSW); CENTRAL COAST: 12.3 km S of northern entrance to Fire Trail No. 1 in Avon-Nepean water catchment area, 34°27'S 150°41'E, *P. Cuneo 39 and R. Jonstone*, 3.xi.1988 (NSW); c. 40 km NNE of Lithgow, Green Gully, 2.5 km SSW of Glen Davis, 33°07'E 150°16'E, *I.R. Telford 5039 and G. Butler*, 25.x.1976 (CANB, NSW); Cascades Track from Douglas St. E, St Ives, 33°42'E 151°11'E, *L. McDougall 124, J. Dawbin and T. Pyke*, 4.x.1989 (NSW); Springwood, *G. Chippendale s.n.*, 30.x.1953 (NSW *385472*); junction of Connellys Ck and Ku-ring-gai Ck, *W. Blakely s.n.*, 4.x.1920 (NSW *385477*); Narrabeen, *W.B. Welch s.n.*, x.1921 (NSW *3855465*); Deers Park, Kings Tableland, Wentworth Falls, 33°43'E 150°23'E, *R. Ball 3*, 17.vii.1988 (NSW); Bobbin Head, *E.F. Constable s.n.*, 24.viii.1948 (NSW *27307*).

Notes: Bentham (1863) included *B. floribunda* within his concept of *B. pinnata*. Guilfoyle (1911) called this Boronia the Many-flowered Boronia, and Galbraith (1977) the Flowery Boronia, names apparently not widely used today. As with many species of *Boronia* there are collections of white-flowered plants (e.g. *Bell* – National Park, NSW *385463*). The species is reliable and attractive in cultivation and horticultural notes are given by Elliot and Jones (1982) and Spencer (2002).

Postulated hybrids: *Boronia floribunda* × *B. serrulata*: Putative hybrids or intermediate forms between *B. serrulata* and *B. floribunda* have been noted from Deewhy (Deewhy, Manly, *T.D. Mutch*, 24.viii.1915, NSW *385635*) by Hamilton (1915), for French's Forest (Frenchs Forest, *E.A. Holden*, ix.1906, *MEL1058108*, NSW) by Maiden (1906) and by Beadle *et al.* (1962, 1972). The specimens seen have pinnate leaves but the leaflets, especially the terminal ones, are elliptic or obovate (cf. narrowly elliptic or narrowly obovate or narrowly oblong) with serrate margins (cf. smooth or minutely serrate). A collection of *B. serrulata* from French's Forest (*C.A. Holden,* ix.1906, NSW *385636*) has a note attached stating "found close to the assumed *floribunda-serrulata* hybrid and assumed to be one of its parents." Spencer (2002) noted that *Boronia* 'Aussie Rose' is a natural hybrid of *B. floribunda* and *B. serrulata*.

Boronia floribunda × *B. microphylla*: Postulated hybrids between *B. floribunda* and *B. microphylla* were noted by Beadle *et al.* (1972), Baldwin (1975), and Elliot and Jones

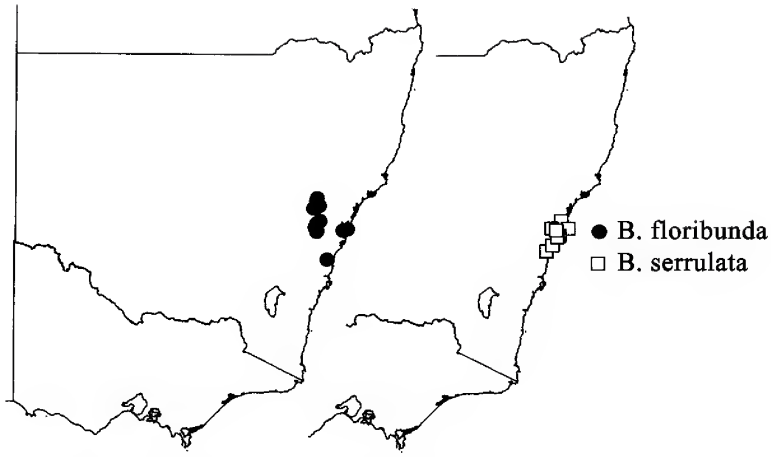

Figure 8. Distribution of *B. floribunda*, *B. serrulata*.

(1982). Specimens of these, from the Blue Mountains (Elliot & Jones 1982), have not been seen by the author.

Distribution and ecology: The species is confined to the Sydney region (Fig. 8) where it is found in heath and dry sclerophyll forest on sandstone. The known distribution, ecology and conservation status of this species in the Central Tablelands and Central Coast areas (NSW) are discussed by Benson and McDougall (2001). Flowering (July-)September-January(-February); fruiting October-January.

Conservation status: Benson and McDougall (2001) indicate that the species is now localized. *Boronia floribunda* is found in a number of reserves, e.g. Garigal, Ku-ring-gai Chase, Blue Mountains and Nattai National Parks (see also Benson & McDougall 2001), and a conservation code of 2RC- is appropriate.

Etymology: *Boronia floribunda* is very floriferous: a feature which the specific epithet presumably alludes to.

20. *Boronia serrulata* Sm., *Tracts nat. hist.* 292, t. 5 (1798). *Type citation*: type not cited. [Though specimens were not cited with the description Smith (l.c., p. 290), in the preamble of the paper, states 'Four species only of the genus in question have been hitherto been detected among dried specimens collected near Port-Jackson, by Mr. White'; later Smith (1807, p. 284) cites one specimen 'Sent by Dr. White, with coloured drawing, from Port Jackson'.] *Type*: Port Jackson, New South Wales [c. 33°49'S 151°17'E, Central Coast], *Mr White s.n.*, 1795 (lectotype, here designated, LINN *684.4 n.v.* [transparency MEL *2041280*]; isolectotypes LINN 684.5 *n.v.* [transparency MEL *2041281*], LIV *n.v.* [photograph CANB]). [Note: see *B. polygalifolia* re Mr White].

[*Boronia serrulata* Paxton, *Paxton's Mag. Bot.* 1;173, & plate (1834), *nom illeg., non* Sm. *Type citation*: "... was raised from seed by Mr. Colville. It is a native of Port Jackson, whence it was introduced in 1816." *Type*: *n.v.*, illustration decisive.]

Illustrations: Smith (*l.c.*); J. Paxton (*l.c.*); J.H. Maiden and W.S. Cambell, *Fl. pl. ferns N.S.W.* 7: 73 No. 26 (1898); M.E. de Wildeman, *Icon. horti. then.* 10; t. 56 (1901); M. Gibbs, *Boronia Babies*, Finding Babies (1922); V. Scarth-Johnson, *Wildflowers of New South Wales* 77 (1968); W.R. Elliot and D.L. Jones, *Encyclopedia of Australian Plants* 2nd edn, 350 (1985), photograph; M. Baker, R. Corringham, and J. Dark, *Native Pl. of the Sydney Region*, 117 (1985), photograph; G. Lamont, *Australian Plants* 13: 156 (1985), photographs; M. Baker, R. Corringham, and J. Dark, *Native Pl. of the Sydney*

Region, 23 (1989), photograph; P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 236 (1991); P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 276 (2002). Erect, woody *shrub* to 1.5 m high, fire sensitive (Benson 1985; Auld 2001). *Branchlets* not obviously glandular, glabrous to minutely hispidulous, or rarely sparsely pilose, hairs confined to area between and on leaf decurrencies, becoming glabrous with age, hairs to 0.5 mm long. *Leaves* simple, sessile or subsessile, crowded, flattened over the stem, strongly aromatic, not obviously glandular, glabrous or sometimes sparsely ciliate and then sometimes only at base; lamina broad-obovate, 6–18 mm long, (1.5–)5–9 mm wide, thick, often red tinged, concolorous, isobilateral with little differentiation between the spongy and palisade mesophyll layers, flat, margins finely toothed, apex acute. Inflorescence terminal, 1–7-flowered, longer than leaves; peduncles and secondary inflorescence units absent or to 2 mm long, sparsely pilose between and on decurrent bract bases; prophylls and metaxyphylls 1–2 mm long, ciliate; flowers sometimes sessile or with anthopodia 1–3.5 mm long, hispidulous between decurrent bract bases. *Sepals* deltate, 2.5–3 mm long, c. 2 mm wide, not obviously glandular, minutely ciliate, tip appearing acuminate due to involute margins. *Petals* bright pink, sometimes white, 6–11 mm long, adaxial surface minutely and sparsely pilose, abaxial surface glabrous, tip with subterminal apiculum. *Staminal filaments* glabrescent to pilose along margins below glandular tip, large multicellular glands prominent along abaxial surface, filament tip swollen and bilobed with a dense tuft of simple hairs, hairs appearing as a white ring when flowers viewed from above; anthers with a row of semi-erect simple hairs pointing distally on abaxial surface of each loculus, apiculum absent or minute, glabrous. *Gynoecium* glabrous; style much smaller than and concealed by massively swollen and spherical stigma. *Cocci* c. 4 mm long, c. 2 mm wide, glabrous or with minute hairs along sutures. *Seed* (mature not seen) black, c. 2 mm long c. 1 mm wide. n=11 (Smith-White 1954; Stace *et al.* 1993). **Native Rose, Rose Boronia.**

Representative specimens examined (c. 60 specimens examined): **NEW SOUTH WALES**: CENTRAL COAST: 2 miles [c. 3.2 km] E of Kariong Trig. [4 miles (c. 6.4 km) SW of Gosford], *E.H. Constable s.n.*, 13.x.1960 (NSW *53860*); 8 km along dirt track (4WD) off Cobar Rd, Arcadia, Marramarra NP, 33°37'S 151°02'E, *J. McCarthy 50*, 1986 (NSW); Road 10C, N of North Cliff mine, O'Hares Ck, 34°12'S 150°52'E, *K. Mills s.n.*, 25.x.1990 (NSW); Uloola track, Royal NP, *R. Coveny s.n.*, 24.ix.1966 (NSW *122262*); Sydney, *S.A. White s.n.* (AD *97735486*); French's Forest, *E.A. Holden s.n.*, ix.1906 (NSW *385636*); N'lle Hollande, *Labillardiere s.n.* (TCD).

Notes: The leaves of *B. serrulata* are similar to those of the fossil taxon, *B. harrisii* (see above), which was described from material from near Tenterfield on the Northern Tablelands. The ontogeny of the foliar sclereids of *B. serrulata* are described and illustrated by Foster (1955). The chemical Rutin, a natural yellow dye also found in *Ruta graveolens*, was extracted from the leaves of *B. pinnata*, *B. serrulata* and *B. thujona* by Morrison (1921).

Currently, the accepted common name for *B. serrulata* is the Native Rose or the Rose Boronia (see Bentham 1863; Maiden & Cambell 1898; Moore & Betche 1893; Beadle *et al.* 1962, 1972, 1982; Galbraith 1977; Baker *et al.* 1985; Lamont 1985a, 1985b; Weston & Porteners 1991; Robinson 1991; Caroline & Tindell 1993; Weston & Duretto 2002) though it has been called the Rose-scented Boronia (Smith 1798), Saw-leaved Boronia (Paxton 1834) and the Port Jackson Fairy Rose or Sydney Rock Rose (Guilfoyle 1911).

Paxton (1841) noted that *B. serrulata* was a most prized glasshouse plant [in 19th Century England] because of its dense and free habit and 'prodigality of its deep and lively pink flowers.' The species is a desirable cut flower, with a heavy rose scent (Elliot & Jones 1982; Lamont 1985a; Plummer & Payne 1997), and was heavily utilized as a wild cut flower in the first half of the 20th century (Auld 2001). Propagation techniques for the species are discussed by Elliot and Jones (1982) and Lamont (1985b). As with many other Boronias white forms of this species have been collected (e.g. *anon.*, MEL *2079093*).

Postulated hybrids: *Boronia serrulata* × *B. floribunda* (see *B. floribunda above*).

Distribution and ecology: *Boronia serrulata* is endemic to near coastal areas, centred on Sydney, in a region bounded by Brisbane Waters National Park, the sandstone ridges on the western side of Mooney Creek at Peats Ridge, the Dharawal State Recreational Reserve, and Waterfall in Royal National Park (Lamont 1985a; Auld 2001) (Fig. 8) with O'Hares Creek being the southern most limit (Keith 1994). It is found growing in moist heath in sandy soils or rocky areas on the Hawkesbury Sandstones (see Lamont 1985a for detailed discussion). The known distribution, ecology and conservation status of this species are discussed by Benson and McDougall (2001). *Boronia serrulata* was found to be self-incompatible by Weston *et al.* (1984). Flowering August-October(-November, Lamont 1985a); fruiting material has been collected in November.

Mueller (1890) noted that he had seen collections of *B. serrulata* from Wagga Wagga [collected by Rev. R. Thom]. The locality was questioned by Maiden and Cambell (1898) but they did state 'I should much doubt the Wagga Wagga locality were it not recorded by the Baron.' The specimen Mueller was referring to has been located at MEL (MEL *255244*). Jacobs and Pickard (1981) also recorded the species from the South West Slopes of New South Wales, probably based on the above data. The collection details on the collection made by Rev. R. Thom are probably incorrect and have not been substantiated. Other collections are stated to have come from outside the Sydney area, e.g. from the Richmond River (North Coast, NSW – *C. Moore*, MEL *2079087*), Queensland (*Dietrich*, MEL *1510457*) and South Australia (*Brummitt*, MEL *2100418*). The specimens are assumed to have either erroneous collection details or were from plants in horticulture.

Boronia serrulata is fire-sensitive, that is, plants die and do not resprout after fire, at least at Brisbane Water (Benson 1985), Ku-ring-gai Chase (Lamont 1985a) and Royal National Parks (Auld & Ooi, cited in Auld 2001). Many other boronias resprout after fire, e.g. *B. parviflora*, *B. safrolifera* (see above) and many species of *B.* section *Valvatae* (Duretto 1999b). This means that *B. serrulata* relies mainly on the soil seed store for recruitment after fire. In the study conducted by Benson (1985), *B. serrulata* took five years to flower from germination after a fire, while Lamont (1985a) noted plants were flowering in two years. Auld and Ooi (cited in Auld 2001) found that some plants were not mature and did not flower even seven years after germinating. Plants growing on rocky outcrops were often protected from fires and could act as a recruitment source for fire affected areas (Benson 1985). In addition, if an area had not been burnt for an extended period then *B. serrulata* will persist on these rocky outcrops while in the heath they die out (Auld 2001).

Myrmecochory has been confirmed for *B. serrulata* (Rice & Westoby 1981; see discussion under *B. parviflora*). Lamont (1985a) noted that the inflorescence of *B. serrulata* is sometimes inhabited by fly larvae (family Cecidomyiidea, order Diptera). The presence of the larvae cause the inflorescence to become heavily sclerified and retained to late winter when they drop after the flies emerge (Lamont 1985a).

Conservation status: *Boronia serrulata* has a limited range and it can be assumed that a massive reduction in distribution and population size has occurred over the last two centuries (see discussion in Lamont 1985a, Benson & McDougall 2001). Of special note is that there are very few recent collections of this species. Auld (2001) discuss population ecology and conservation issues of *B. serrulata*. The fire ecology of the species requires further study to ensure appropriate management regimes are put in place (see above; Benson 1985; Lamont 1985a; Auld 2001). *Boronia serrulata* has been collected from several national parks and reserves, e.g. Brisbane Water, Ku-ring-gai Chase and Royal National Parks, some of which contain large populations (see also Auld 2001; Benson & McDougall 2001).

Briggs and Leigh (1996) and Walter and Gillett (1997) considered this species to be rare but a conservation code of 2VC- is more appropriate.

Etymology: The specific epithet is derived from the Latin, *serrulatus* (serrate), referring to the serrate leaf margins.

21. *Boronia citriodora* Gunn ex Hook.f., *Fl. Tasman.* 1: 68 (1855); *B. pinnata* var. *citriodora* (Gunn ex Hook.f.) Rodway, *Tasman. Fl.*, 22 (1903). *Type citation*: "Gunn, 667, 894?." *Type*: Black Bluff 4500' high [Tasmania], *Gunn 667*, 15.2.1937 (lectotype, here designated, K *n.v.* [cibachrome MEL *2041276*, photograph AD *99803353*]); Tasmania, *Gunn s.n.* (probable isolectotype TCD [ex herb. Hook; transparencies HO, MEL *2068544*]); *Gunn 894* (*n.v.*).

[*Boronia variabilis* Hook. var. γ Hook., *J. Bot. (Hooker)* 1: 255 (1834), *nom inval.* Specimens cited: "Mr. Gunn, (n. 303.), who observes that it is called Lemon-plant." *n.v.* Note: Placed in synonymy under *B. citriodora* as Gunn called it the Lemon-plant: only *B. citriodora*, in Tasmania, has a distinctive lemon scent. Gunn refers to the 'grateful' lemon scent of *B. citriodora* in a letter with the *Gunn 667* specimen lodged at K; see above. W.J. Hooker (1836) transfers this variety to *B. tetrandra* in which he in 1840 included the type material of *B. citriodora* and the many forms of *B. pilosa*.]

Illustrations: M. Stone and W. Curtis, *The Endemic Flora of Tasmania*, part 1, p. 37, No. 9 (1967); M. Cameron, *Guide to Flowers and Plants of Tasmania*, pl. 11 (1981).
Prostrate to erect, woody *shrub*, to 3 m tall. *Branchlets* not obviously to slightly glandular tuberculate, hispidulous, hairs sometimes concentrated between faint leaf decurrencies (if present), becoming glabrous with age, hairs to 0.1(–0.2) mm long, branchlets sometimes developing adventitious roots. *Leaves* imparipinnate, (1–)3–9-foliolate, entire leaf in outline 7–25 mm long, 7–30 mm wide; petiole 1.5–6 mm long, slightly glandular tuberculate or not, adaxial surface puberulous, abaxial surface glabrescent to hispidulous; rachis segments 1.5–6 mm long, slightly glandular tuberculate or not, adaxial surface puberulous to glabrous, distal segments with fewer hairs, abaxial surface glabrous or glabrescent; terminal leaflets 3.5–15 mm long, 0.75–4 mm wide, narrowly elliptic to narrowly oblanceolate, flat to semiterete, concolorous, dorsiventral (ssp's *citriodora*, *orientalis*, *paulwilsonii*), glabrescent to sparsely hispidulous at base to sparsely hispidulous, margins entire, faintly and minutely serrate towards apex or not, tip acute; lateral leaflets similar to terminal leaflets but longer, 3–16 mm long, (0.5–)1–3.5 mm wide. *Inflorescence* axillary and terminal, 1–7-flowered, very sparsely hispidulous to hispidulous, shorter to longer than leaves; peduncles 1–8 mm long; prophylls 0.5–3 mm long, simple or ternate; metaxyphylls 1–1.5 mm long; anthopodia 1.5–15 mm long. *Sepals* deltate, 0.75–2.5 mm long and wide, not or slightly glandular tuberculate, adaxial surface glabrous, abaxial surface minutely ciliate or slightly and sparsely hispidulous. *Petals* white to pink, 3.5–8.5 mm long, adaxial surface sparsely pilose, abaxial surface glabrous or minutely ciliate or sparsely pubescent along margins or sparsely pilose, tip with subterminal apiculum. *Staminal filaments* margins and distal ends sparsely pilose, glandular tuberculate towards apex; anthers glabrous, not apiculate. *Ovary* glabrous; style glabrous or with few hairs, 0.75 mm long; stigma entire, wider than style. *Cocci* 3–4 mm long, 1.5–2 mm wide, glabrous or glabrescent. *Seed* (mature seen for subsp. *paulwilsonii* only) black, 2–2.25 mm long, 1.25–1.5 mm wide. **Lemon Plant, Lemon Boronia.** (Figs 6 H-L).

Notes: Mueller (1860-62) considered *B. citriodora* to be part of his broad concept of *B. pinnata*. Bentham (1863) relegated *B. gunnii* (under which he synonymised *B. citriodora*) to a variety of *B. pinnata*.

Jarman *et al.* (1988) considered *B. citriodora* to be an indicator species of the eastern moor above 600 m of south-west Tasmania and the central plateau. Plants they were referring to in the south-west were probably *B. elisabethiae* which is usually found in more exposed situations than *B. citriodora* subsp. *paulwilsonii*, which they called '*B. pilosa* [glabrous leaved form]'.

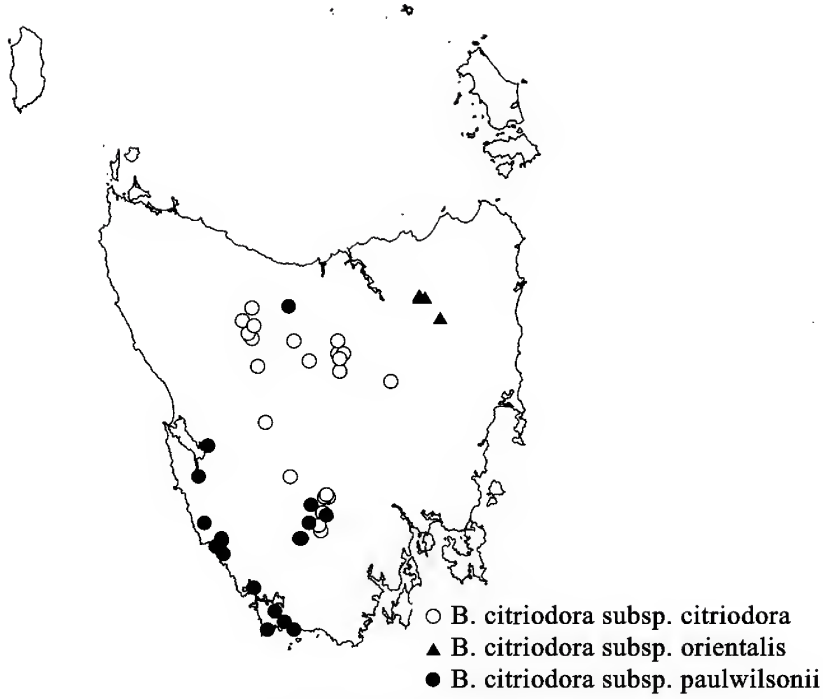

Figure 9. Distribution of *B. citriodora* subsp. *citriodora*, *B. citriodora* subsp. *orientalis*, *B. citriodora* subsp. *paulwilsoni*.

Penfold (1925) extracted citronellol, a volatile oil with a rose-like odour, from *B. citriodora* and the species proved to be such a rich source of the oil that he thought it could be of significant commercial potential.

The fruit of *B. citriodora* are said to be eaten by the orange-bellied parrot in south-west Tasmania (Jarman *et al.* 1988).

Distribution and Ecology: *Boronia citriodora* is confined to Tasmania where it is found in the Central Highlands (subsp. *citriodora*), Ben Lomond and Mt Barrow (subsp. *orientalis*) and in the South-West (subsp. *paulwilsonii*) (Fig. 9). The species is found in heath, woodland, or along rainforest borders, often in rocky areas. Flowering November-March(-May); fruiting November-April.

Records of *B. citriodora* from Victoria, e.g. by Curtis and Morris (1975), Forbes *et al.* (1984), Forbes and Ross (1988a, b), Gullan *et al.* (1990), Ross (1990) and Kirkpatrick (1997), would be based on material of *B. citrata*.

Conservation status: The species is found in a number of large reserves throughout its range and appears secure though *B. citriodora* subsp. *orientalis* is poorly collected and found over a limited area.

Etymology: The name is derived from the characteristic lemon scent of the foliage. The species was called the Lemon-plant by the early colonists in Tasmania (J.D. Hooker 1855).

Key to the subspecies of B. citriodora

1. Sepals sparsely hispidulous to hispidulous abaxially (NE Tas. - Mt Barrow, Ben Lomond) ..... **22c.** subsp. ***orientalis***
1: Sepals glabrous abaxially, minutely ciliate (W & Central Tas.) 2
2. Leaves less than 15(-17 and then leaves mostly trifoliolate) mm long; lateral leaflets to 10 mm long, 1-2 mm wide (to 13 x 2.5 mm, Mt Field); anthopodia 1.5–4.5 mm long; sepals 0.75–1.5 mm long (Central Tas.) ..... **21a.** subsp. ***citriodora***

2: Largest leaves greater than 15 mm long; largest lateral leaflets greater than 10 mm long, 1.75-4.5 mm wide; anthopodia 5–15 mm long; sepals 1.5–2.5 mm long (SW Tas.) ..... **22b.** subsp. ***paulwilsonii***

21a. *Boronia citriodora* Gunn ex Hook.f. subsp. ***citriodora***

Illustrations: G.R. Cochrane, B.A. Fuhrer, E.D. Rotherham and J.H. Willis, *Flowers and Plants of Victoria and Tasmania* 123, t. 625, (1980, 3rd edn), photograph, as *B. citriodora*; P. Kirkpatrick, *Alpine Tasmania*, 49, Fig. 20e (1997), as *B. citriodora*.

Erect to prostrate *shrub* to 60 cm tall. *Leaves* (1–)3–5(–7)-foliolate, entire leaf in outline 7–15(–17, Mt Field) mm long, 7–22 mm wide; petiole 1.5–4.5 mm long; rachis segments 1.5–3 mm long; terminal leaflets 4–10(–12, Mt Field) mm long, 0.75–2.5 mm wide, flat to semiterete; lateral leaflets 3–10(–13, Lake Dobson, Mt Field) mm long, (0.5–)1–2(–2.5) mm wide. *Inflorescence* 1–3-flowered; peduncles 1.5–5 mm long; anthopodia 1.5–4.5 mm long. *Sepals* 0.75–1.5 mm long and wide, abaxial surface glabrous, minutely ciliate. *Petals* 3.5–7 mm long. Mature seed not seen.

Representative specimens (c. 110 specimens examined): **TASMANIA**: CENTRAL HIGHLANDS: Fatigue Hill, *Gunn 667*, 11.ii.1845 (NSW *385787*); Millers Bluff, 25 km W of Campbell Town, 41°56'S 147°10'E, *P. Collier 4988*, 8.xii.1990 (HO); Black Buff Range Lookout on minor route 132, 41°32'S 145°52'E, *N.S. Lander 1479*, 26.i.1993 (HO, PERTH); In Cradle Mountain NP, on Maryland Track, 41°38'S 145°56'E, *J. West 4851*, 27.i.1983 (CANB, HO); Road to Lake McKenzie, N of junction to Devils Gullet car park, 41°40'S 146°19'E, *E. Vitek s.n.*, 5.ii.1991 (HO *131437*); Great Western Tiers, Lake Hwy, 5.7 km N of Breona, 41°45'S 146°42'E, *F.E. Davies 979 and P. Ollerenshaw*, 18.i.1989 (AD, CANB, HO, PERTH); Close to Summit of Mt Arrowsmith, 42°12'S 146°04'E, *P. Collier 4450*, 8.xii.1989 (HO); Abbotts lookout, c. 4 km SE of Maydena, 42°47'E 146°34'E, *A. Moscal 10323*, 23.iii.1985 (HO); MOUNT FIELD: Wombat Moor, Mt Field NP, 42°41'S 146°37'E, *J. Sommerville s.n.*, 20.i.1994 (HO *4579*); 500 m SE of Lake Dobson, Mt Field NP, 42°41'S 146°35'E, *J.M.B. Smith 234*, 5.i.1978 (HO, NE); SOUTH WEST: Jubilee Range, 42°54'S 146°33'E, *A.M. Buchanan 5236*, 13.i.1985 (HO); Jubilee Range, 42°52'S 146°32'E, *A. Moscal 9389*, 16.i.1985 (HO); SE ridge of Great Dome, 42°33'S 146°17'E, *A.M. Buchanan 12999*, 30.i.1993 (HO).

Notes: Few plants from Mt Field, and particularly Wombat Moor, have leaves to 17 mm long (as with subsp. *paulwilsonii*) while other plants from this area key out easily to the type subspecies. *Boronia citriodora* subsp. *paulwilsonii* is found nearby in the South West (e.g. Risbys Plain, *A. Moscal 10385*). Some specimens (e.g. *Collier 4450*) have adventitious roots, as does *B. elisabethiae*: this is a rare feature in *Boronia*.

Distribution and ecology: *Boronia citriodora* subsp. *citriodora* is confined to the Central Highlands of Tasmania above 900 m, with outlying populations found to the south, e.g. Mt Field (Fig. 9). The taxon is found in peaty and/or rocky soils in alpine and subalpine moors, fjeldmark, alpine meadows, heath and woodland. Flowering November-March(-May); fruiting November-April.

Conservation status: *Boronia citriodora* subsp. *citriodora* is common, widespread, well represented in reserves and probably secure.

21b. *Boronia citriodora* subsp. ***paulwilsonii*** Duretto, *subsp. nov*

A varietate typica foliis, sepalis et petalis majoribus differt.

Type: TASMANIA: SOUTH WEST: on track to Mt Elisa, 42°57'S 146°23'E, *M.F. Duretto 833 and P.G. Neish*, 9.i.1996 (holotype MEL *2045790*; isotypes CANB, HO). (Figs 6 H-I).

Erect *shrub* to 3 m tall. *Leaves* 3–9-foliolate, entire leaf in outline 15–25 mm long, 10–30 mm wide; petiole 3–6 mm long; rachis segments 2–6 mm long; terminal leaflets 5-15 mm long, 1.5–4 mm wide, flat; lateral leaflets 7–16 mm long, 1.5–3.5 mm wide. *Inflorescence*

1–7-flowered; peduncles 1.5–8 mm long; anthopodia 5–15 mm long. *Sepals* 1.5–2.5 mm long and wide, abaxial surface glabrous, minutely ciliate. *Petals* 6–8.5 mm long. *Seed* 2–2.25 mm long, 1.25–1.5 mm wide.

Representative specimens (c. 65 specimens examined): **TASMANIA**: SOUTH WEST: Birch's River Plain, 42°32'S 145°28'E, *A.M. Buchanan 1294*, 14.xi.1983 (HO); Risbys Plains, 42°48'S 146°36'E, *A. Moscal 10385*, 24.iii.1985 (HO, MEL); Summit of Mt Osmund, 42°51'S 145°32'E, *A.M. Buchanan 6103*, 2.iii.1986 (HO); Wilson Bight, 43°32'S 146°05'E, *A.M. Buchanan 9415*, 13.i.1987 (HO); Giblin River, c. 2 km from mouth, 43°03'S 145°42'E, *A.M. Buchanan 7773*, 10.i.1986 (HO); Foot of W ridge of Mt Gaffney, 43°05'S 145°45'E, *A.M. Buchanan 7847*, 13.i.1986 (HO); Birch Inlet, hills 1.5 km E of hut, 42°33'S 145°29'E, *A.M. Buchanan 1310*, 15.xi.1983 (HO); Creek at southern base of Elliot Hill, 43°00'S 145°38'E, *R. Buttermore 092*, 17.i.1986 (HO); Low hills 1.5 km east of hut at Birchs River (Junction with Hobbs Ck), 42°33'S 145°29'E, *A.M. Buchanan 1302*, 15.xi.1983 (HO); Kelly Range adjacent to Kelly Basin, Macquarie Harbour, 42°21'S 145°34'E, *S.J. Berrigan 204*, iii.1979 (HO); Summit of the Lawson Range, 42°57'S 145°41'E, *A.M. Buchanan 8112*, 25.i.1986 (HO); Eastern edge of Freney Lagoon, Cox Bight, 43°29'S 146°14'E, *A.E. Orchard 5766*, 31.xii.1982 (HO, MEL); on track to The Needles, 42°44'S 146°28'E, *M.F. Duretto 815-818, 820 and P.G. Neish*, 9.i.1996 (*MFD815* – HO, MEL; *MFD817* – AD, MEL; *MFD816, 818* – CANB, MEL; *MFD820* – MEL, NSW); 8 km S of Mt Mueller, 42°51'S 146°27'E, *A. Moscal 11435*, 25.xi.1985 (HO, MEL); Anchorage Cove, Louisa Bay, 43°32'S 146°19'E, *A.M. Buchanan 5701*, 18.ii.1985 (HO); on track to Mt Elisa, 42°57'S 146°23'E, *M.F. Duretto 829-831 and P.G. Neish*, 9.i.1996 (*MFD829, 831* – MEL; *MFD830* – HO, MEL, NSW); Melaleuca, Port Davey, 43°25'S 146°09'E, *P. Brown s.n.*, 28.xi.1983 (HO); Coffin Bay, Port Davey, 43°16'S 145°58'E, *A.M. Buchanan 9222*, 4.i.1987 (HO); Lawson Range, 42°58'S 145°41'E, *A. Moscal 11942*, 25.i.1986 (HO); NORTH-WEST: Badgers Range, Sheffield, 41°21'S 146°22'E, *P. Collier 3711*, 30.x.1988 (HO); Gog Range, 5 km NE of Mole Creek, 41°30'S 146°28'E, *M.J. Brown 1387*, 9.ix.1986 (HO).

Notes: *Boronia citriodora* subsp. *paulwilsonii* differs from the typical variety by the larger leaves (15–25 mm long, 10–30 mm wide; cf. 7–15(–17) mm long, 7–22 mm wide), sepals (1.5–2.5 mm long; cf. 0.75–1.5 mm long) and petals (6–8.5 mm long; cf. 3.5–7 mm long); and from subsp. *orientalis* by the ciliate sepals (cf. pubescent).

Jarman *et al.* (1988) discussed a taxon they called '*Boronia pilosa* (glabrous leafed form)' which is probably *B. citriodora* subsp. *paulwilsonii*. They considered this taxon to be an indicator species for Blanket Moor below 700 m [western Tasmania mainly] on well drained peat. The subspecies is often found near *B. elisabethiae* from which it can be easily distinguished by the erect habit (cf. semi erect to prostrate) and large leaves (15–25 mm long; cf. 5–11(–15) mm long) with broad leaflets (1.5–4 mm wide; cf. 0.5–1 mm wide). *Boronia citriodora* subsp. *paulwilsonii* is usually found in more sheltered positions such as near small stands of rainforest or tall scrub while *B. elisabethiae* occurs in more exposed situations.

Distribution and ecology: *Boronia citriodora* subsp. *paulwilsonii* is confined to south-west Tasmania, south from Macquarie Harbour and west from Mt Shea, with isolated collections made from in the north-west from near Sheffield and Mole Creek (Fig. 9). These later collections require confirmation and further study. The subspecies is found in a variety of usually wet habitats including, *Eucalyptus/Nothofagus* woodland, rainforest borders, tall closed or open heath, shrubland on rocky outcrops, heath dominated by rushes and sedges on slopes, ridge tops or near creeks and rivers. Flowering November-March(-May); fruiting November-April.

Conservation status: The subspecies is widespread, found in several reserves and appears secure.

Etymology: The subspecies is named for Paul Wilson (PERTH) in recognition of his outstanding contribution to systematic research in Rutaceae, amongst other families, as well as for his personable nature and enthusiasm directed to other workers.

21c. *Boronia citriodora* subsp. ***orientalis*** Duretto, *subsp. nov.*

A varietate typica sepalis hirsutis differt.

Type: TASMANIA: BEN LOMOND: Mt Barrow, 41°23'S 147°25'E, *T.E. Burns 244*, 27.xii.1959 (holotype HO *4565*). (Figs 6 J-L).

Erect *shrub* to 1.2 m tall. *Leaves* 3–7-foliolate, entire leaf in outline 7–14 mm long, (7–)18–22 mm wide; petiole 1–3 mm long; rachis segments 1–3 mm long; terminal leaflets 3.5–10 mm long, 1–2 mm wide, flat to semiterete; lateral leaflets 4-11 mm long, 1–1.75 mm wide. *Flowers* solitary; peduncles 1–2 mm long; anthopodia 2–3 mm long. *Sepals* 1.75–2 mm long, 1–1.25 mm wide, abaxial surface sparsely hispidulous. *Petals* 5.5–6 mm long. Fruit and seed not seen.

Additional specimens examined: **TASMANIA**: BEN LOMOND: Mt Barrow Plateau, 41°23'S 147°25'E, *A.C. Rozefelds 162–164,* 1.iii.1996 (*ACR162* - HO, MEL; *ACR163–164* - HO); Mt Barrow Plateau, 41°23'S 147°28'E, *M.G. Noble 1310*, 20.xii.1979 (HO); Plateau and summit Mt Barrow, Dorsett, *H.M.R. Rupp s.n.*, i.1922 (NSW *385783*); The Plateau, Mt Barrow, *H.M.R. Rupp s.n.*, i.1922 (MEL *2098209,* MEL *2100514*); Mt Barrow, 2.4 km from radio station towards Launceston, *E.M. Canning 2648 & 2654*, 13.2.1969 (CANB); Mt Barrow, 41°23'S 147°25'E, *T.E. Burns 243*, 27.xii.1959 (HO); *ibid, anon.*, 15.i.1953 (HO *4650*); *ibid, M. Lindale s.n.*, 17.xii.1954 (NSW *384788*); Slopes of Mt Barrow, 41°22'S 147°25'E, *N.T. Burbidge 3009*, 9.i.1949 (HO); Ben Lomond NP, NW corner of plateau, 41°31'S 147°36'E, *M.G. Noble 29177*, 31.iii.1980 (HO).

Notes: *Boronia citriodora* subsp. *orientalis* differs from the other varieties by the pubescent sepals (cf. ciliate); and from the nearby *B. hippopala* and *B. hemichiton* by the larger sepals and larger leaflets (see discussion under *B. hippopala*).

Distribution and ecology: This subspecies is confined to Ben Lomond, where it is known from a single collection, and Mt Barrow north eastern Tasmania (Fig. 9), where it is found in alpine heath. Flowering December-February.

Conservation status: *Boronia citriodora* subsp. *orientalis* is found over a limited area and only one collection is know from Ben Lomond: a conservation code of 2VC- is appropriate.

Etymology: The subspecific epithet is Latin for east and refers to the subspecies being located to the east of the other two subspecies.

22. *Boronia citrata* N.G.Walsh, *Muelleria* 8: 21 (1993), Fig. 1a-c. *Type*: VICTORIA: EASTERN HIGHLANDS: 6.4 km E of Licola, Victorian Plant Grid S35, *A.C. Beauglehole 43385, E.A. Chesterfield* and *J.H. Willis*, 21.x.1973 (holotype MEL *542677*; isotype CANB *373741*).

["*Boronia citriodora*" *auct. non* Gunn ex Hook.f.: S.J.Forbes, P.K. Gullan, R.A. Kilgour and M.A. Powell, *A Census of the Vascular Plants of Victoria*, 96 (1984); S.J. Forbes and J.H. Ross, *A Handbook to Plants in Victoria, Supplement*, 12 (1988); S.J. Forbes and J.H. Ross, *A Census of Vascular plants of Victoria, 2nd edn*, 83 & 103 (1988); P.K. Gullan, D.C. Cheal and N.G. Walsh, *Rare and threatened plants in Victoria*, 9 & 30 (1990); J.H. Ross, *A Census of the Vascular Plants of Victoria, 3rd edn*, 86 (1990)].

Boronia sp. aff. citriodora: J.H. Ross, *A Census of the Vascular Plants of Victoria, 4th edn*, 98 & 120 (1993).

Illustrations: N.G. Walsh (*l.c.*); M.F. Duretto, *Fl. Victoria* 4: 163, Fig. 29g (1999).

Erect, woody *shrub* to 0.8(–1.5) m tall, hispidulous apart from flowers. *Branchlets* not obviously glandular, leaf decurrencies faint if present, hairs to 0.1 mm long. *Leaves* imparipinnate, 5–11-foliolate, entire leaf in outline 6–22 mm long, 6–20 mm wide, pungently lemon scented (*fide* Albrecht & Walsh 1993), not obviously glandular; petiole 1.5–3.5 mm long; rachis segments 1–2.5 mm long; terminal leaflets 1–7 mm long, 1–2 mm wide, narrowly obovate, concolorous, margins entire or slightly and irregularly dented, apex obtuse; lateral leaflets similar to terminal leaflets but longer, 3–10 mm long, 1–3 mm wide. *Inflorescence* terminal and axillary, 1–5-flowered, longer than leaves;

peduncles to 5 mm long; prophylls 1–1.5 mm long; metaxyphylls 0.5–1.5 mm long; anthopodia 3–7 mm long. *Sepals* deltate, 1–1.5 mm long, c. 1 mm wide, not obviously glandular, adaxial surface glabrous, abaxial surface sparsely hispidulous, ciliate, tip with slight subterminal apiculum. *Petals* pale to rosy pink, 4–6.5 mm long, adaxial surface sparsely pilose, abaxial surface hispidulous with hairs concentrated towards apex and along margins, tip with slight subterminal apiculum. *Staminal filaments* pilose, glandular tuberculate towards apex; anthers glabrous, not apiculate. *Ovary* glabrous to hispidulous; style glabrous or with few hairs, c. same length as stigma; stigma globular, 4-lobed, wider than style, style and stigma together c. 0.5 mm long. *Cocci* 3–3.5 mm long, 1.5–2 mm wide, hispidulous. *Seed* (*fide* Albrecht & Walsh 1993) dark brown, 2–3 mm long. **Lemon Boronia**.

Additional specimens examined: **VICTORIA**: EASTERN HIGHLANDS: 2.3 km due S of Mt Ronald, headwaters of Stony Ck, 37°37'S 146°42'E, S35, *D.E. Albrecht 4967 and N.G. Walsh*, 28.iv.1992 (CANB *n.v.*, HO *n.v.*, MEL, PERTH *n.v.*); Subalpine moors near Mt MacDonald, *E. Chesterfield s.n.*, 21.iii.1973 (MEL *1608227*); Headwaters of Stony Ck, Mt Wellington area, *E.A. Chesterfield s.n.*, 15.vii.1973 (MEL *516720*); 4 miles east of Licola (in eastern head of Stony Ck, *J.H. Willis s.n.*, 20.x.1973 (MEL *503637*, CANB).

Notes: The records of *B. citriodora* from Victoria, e.g. by Curtis and Morris (1975), Forbes *et al.* (1984), Forbes and Ross (1988a, b), Gullan *et al.* (1990), Ross (1990) and Kirkpatrick (1997), would have been based on specimens of *B. citrata*. *Boronia citrata* is distinguished from *B. citriodora* by the hispidulous leaves (cf. glabrous to hispidulous proximally only) and from *B. hemichiton* and *B. hippopala* by not having glandular tuberculate stems and narrowly obovate leaflets (cf. linear).

Distribution and ecology: The species is restricted to the catchment area of the Macalister River, to the north and east of Licola, Victoria (Fig. 7). The few known populations occur in subalpine low open forest, mallee and heath communities on shallow soils. Flowering material has been collected in April, July and October and fruiting material in October.

Conservation status: The species has been considered to be vulnerable (Gullan *et al.* 1990, who listed it as *B. citriodora*; Ross 2000) or rare (Albrecht & Walsh 1993; Briggs & Leigh 1996; Walter & Gillett 1997). There are large numbers of plants conserved in Alpine National Park (Briggs & Leigh 1996) but the overall distribution of *B. citrata* is small and so a conservation code of 2VCa is appropriate.

Etymology: The specific epithet is derived from the Latin, *citratus* (lemon-like), referring to the strong lemon smell of the foliage.

23. *Boronia hippopala* Duretto, *sp. nov.*

A *Boronia citriodora* Gunn ex Hook. et *B. pilosa* Labill. caulibus, foliis et coccis dense hispidulis differt; a *B. hemichiton* Duretto stylis pilosis, foliis et cocci dense hispidulis, sepalis majoribus et petalis brevioribus differt.

Type: TASMANIA: BEN LOMOND: Near and above Horseshoe Marsh, St Pauls River, 41°43'S 148°06'E, *M.F. Duretto 852 and P.G. Neish*, 13.i.1996 (holotype MEL *2068547*; isotype HO). (Figs 10 A-C).

Erect, woody *shrub* to 1.5 m tall, hispidulous apart from flowers. *Branchlets* not obviously glandular to slightly glandular tuberculate, leaf decurrencies present, hairs to 0.05 mm long. *Leaves* imparipinnate, 3–7-foliolate, entire leaf in outline 6–10 mm long, 6–14 mm wide, not to slightly glandular tuberculate; petiole 2–3 mm long; rachis segments 1–3 mm long; terminal leaflets 1–4 mm long, 1–1.75 mm wide, linear to narrowly elliptic to narrowly obovate, flat, concolorous, semiterete with palisade mesophyll encircling leaflet, margins entire, tip acute; lateral leaflets similar to terminal leaflets but longer, 2.5–8 mm long, 0.75–1.5 mm wide. *Inflorescence* axillary, 1–3-flowered, shorter than or as long as leaves; peduncles to 1 mm long; prophylls and

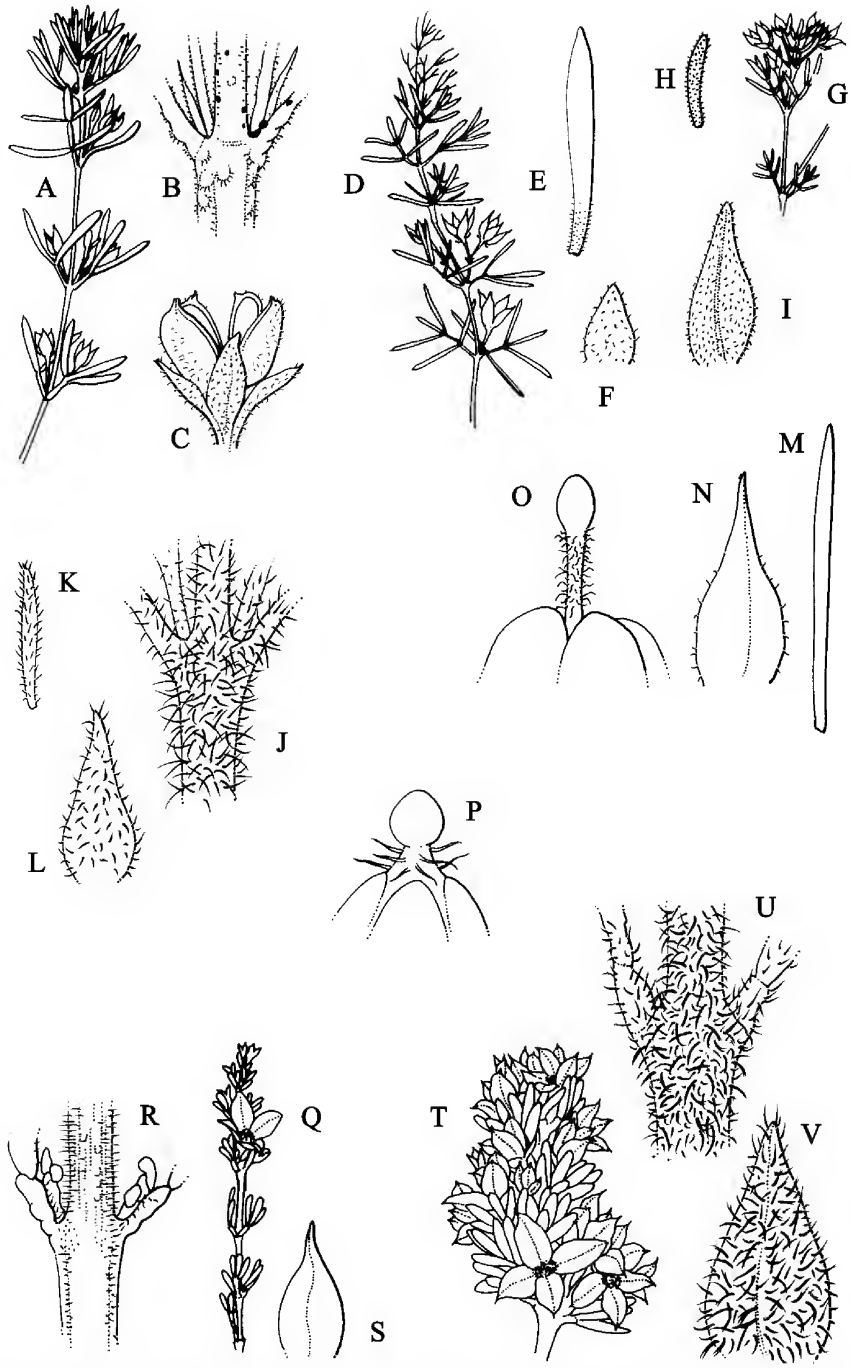

Figure 10. A-C, *B. hippopala*: A, flowering branchlet, × 1; B, stem, × 10; C, flower in fruit with sepals and cocci, × 5 (A-C, *Duretto 852*, MEL *2068547*). D-F, *B. hemichiton*: D, flowering branchlet, × 1; E, leaflet, × 3; F, abaxial surface of sepal, × 10 (D-F, *Buchanan 2135*, HO *89649*). G-I, *B. elisabethiae*: G, flowering branchlet, × 1; H, leaflet, × 3; I, abaxial surface of sepal, × 10 (G-I, *Duretto 834*, MEL *2046925*). J-O, *B. pilosa* subsp. *pilosa*: J, stem × 10; K, leaflet, × 3; L, abaxial surface of sepal, × 10; M, leaflet, × 3; N, abaxial surface of sepal, x 10; O, gynoecium, x 10 (J-L, *Muir 4789,* MEL; M-O, *Buchanan 8866*, HO *406463*). P, *B. pilosa* subsp. *torquata*: gynoecium, × 40 (*Walsh 3088,* MEL *2013336*). Q-S, *B. pilosa* subsp. *parvidaemonis*: Q, flowering branch, × 1; R, stem, × 10; S, abaxial surface of sepal, × 10 (Q-S, *Walsh 5377*, MEL *2104896*). T-V, *B. pilosa* subsp. *tasmanensis*: T, flowering branch, × 1; U, stem, × 10; V, abaxial surface of sepal, × 10 (T-V, *Kantvilas 13*, HO *31677*).

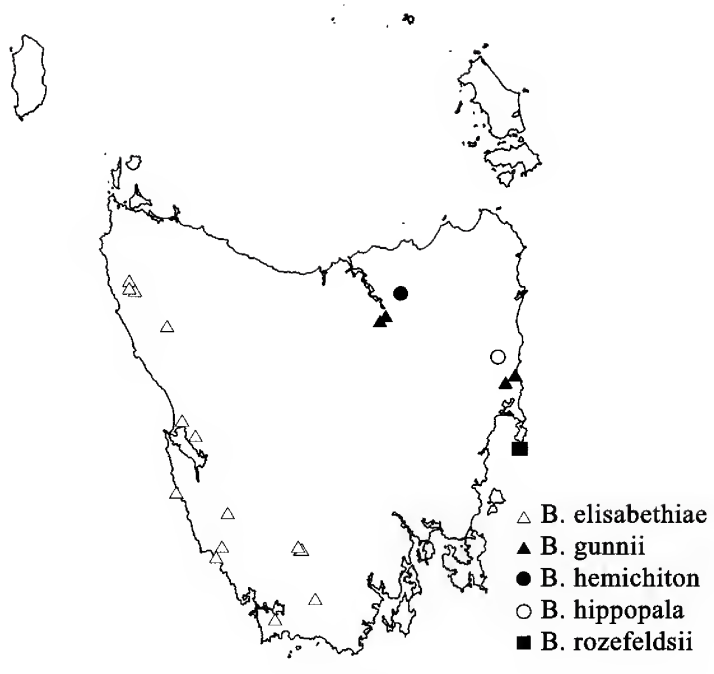

Figure 11. Distribution of *B. elisabethiae*, *B. gunnii*, *B. hemichiton*, *B. hippopala*, *B. rozefeldsii*.

metaxyphylls 0.5–1 mm long; anthopodia 1.5–2 mm long. *Sepals* narrowly deltate, 1–1.75 mm long, 0.5–1 mm wide, not obviously glandular, adaxial surface puberulous towards apex, abaxial surface hispidulous. *Petals* white to pink, 3.5–4.5 mm long, adaxial surface sparsely puberulous, abaxial surface sparsely hispidulous, hairs concentrated on margins, tip with subterminal apiculum. *Staminal filaments* glandular tuberculate towards apex, margins and distal ends pilose but not densely so; anthers glabrous, not apiculate. *Ovary* glabrous or glabrescent; style sparsely and minutely pilose, sometimes only at base; stigma entire, minute, as wide or slightly wider than style; style and stigma together 0.5–1 mm long. *Cocci* c. 2.5 mm long, c. 1.5 mm wide, hispidulous. *Seed* dark brown to black, 1.5–2 mm long, 1–1.25 mm wide.

Additional specimens examined: **TASMANIA**: BEN LOMOND: Horseshoe Marsh, St Pauls River, 41°42'S 148°06'E, *A. Moscal 277-278*, 9.iv.1980 (HO); Near and above Horseshoe Marsh, St Pauls River, 41°43'S 148°06'E, *M.F. Duretto 851, 853-855 and P.G. Neish*, 13.i.1996 (*MFD851* – CANB, HO, MEL; *MFD853-855* – MEL).

Notes: *Boronia hippopala* appears to be most closely related to *B. hemichiton* from which it can be distinguished by the hispidulous leaves (cf. hispidulous proximally only) and cocci (cf. glabrous), larger sepals (1–1.75 mm long; cf. 0.75–1.25 mm long) and smaller petals (3.5–4.5 mm long; cf. 4.5–5.5 mm long). As with *B. citriodora* the species has leaves with a faint lemon, though unpleasant, scent when crushed (pers. obs., and as with *B. citrata*) and stems and leaves that are slightly glandular. *Boronia hippopala* can be distinguished from *B. citriodora*, and *B. pilosa* (which is found nearby and *B. hippopala* is superficially similar to), by the densely hispidulous leaves and cocci. *Boronia hippopala* and *B. hemichiton* are known from few collections and further field studies are required to determine if the characters that distinguish them (e.g. perianth size, pubescence of cocci and leaves etc) hold true throughout their distribution. Geographically, *B. citriodora* subsp. *orientalis* lies between these two species, and like

them has hispidulous sepals, a feature not shared with the other two subspecies of *B. citriodora*. These three species, and *B. citrata*, *B. elisabethiae* and *B. gunnii*, are closely related and further research using additional collections and alternative data sources (e.g. chemical) are required to elucidate relationships.

Distribution and ecology: *Boronia hippopala* has only been collected from near Horseshoe Marsh in northeastern Tasmania (Fig. 11). It is found in or near *Eucalyptus* woodland on stony ground. Flowering and fruiting material has been collected in January.

Conservation status: *Boronia hippopala* is known from two sets of collections (seven collections in total). When sampled by the author only eight plants were seen though extensive surveys were not made at the time. Detailed surveys are required to ascertain the full extent of the known population of this species. The population is beside a road and would be threatened by road maintenance and upgrades. A conservation code of 2E is appropriate.

Etymology: The epithet is derived from the Latin, *hippo* (horse) and *palus* (marsh), and refers to the only known locality for this species.

24. *Boronia hemichiton* Duretto, *sp. nov.*

A *Boronia citriodora* Gunn ex Hook. et *B. pilosa* Labill. caulibus dense hispidulis differt; a *B. hippopala* Duretto stylis et coccis glabris, sepalis brevioribus et petalis longioribus differt.

Type: TASMANIA: BEN LOMOND: Mt Arthur, 41°18'S 147°15'E, *A.M. Buchanan 2135*, 24.xii.1983 (holotype HO *89649*; isotype MEL *2100472*). (Figs 10 D-F).

Probably weak, woody *shrub,* to at least 30 cm tall and wide. *Branchlets* slightly glandular tuberculate, leaf decurrencies present if faint, hispidulous, becoming glabrous with age, hairs to 0.1 mm long. *Leaves* imparipinnate, 3–7-foliolate, entire leaf in outline 9–12 mm long, 12–16 mm wide, slightly glandular tuberculate; petiole 1.5–2.5 mm long, hispidulous; rachis segments 1.5–2 mm long, hispidulous; terminal leaflets 2.5–8 mm long, 0.5–1 mm wide, linear to narrowly elliptic to narrowly obovate, concolorous, flat, hispidulous on proximal portion otherwise glabrous or glabrescent, margins entire and very minutely serrate towards apex, tip acute; lateral leaflets similar to terminal leaflets but longer, 2–9 mm long, 0.5–1 mm wide. *Inflorescence* axillary, 1–3(–5)-flowered, shorter to longer than leaves; peduncles 1–2 mm long, hispidulous; prophylls and metaxyphylls 0.5–2 mm long, hispidulous or ciliate; anthopodia 2–4 mm long, hispidulous. *Sepals* narrowly deltate, 0.75–1.25 mm long, 0.25–0.5 mm wide, not to slightly glandular tuberculate, adaxial surface glabrous, abaxial surface glabrescent to sparsely hispidulous, hairs concentrated towards apex. *Petals* white to pink, 4.5–5.5 mm long, adaxial surface sparsely and minutely pilose, abaxial surface hispidulous, hairs concentrated at margins and tips, tip with subterminal apiculum. *Staminal filaments* glandular tuberculate towards apex, margins and distal ends sparsely pilose; anthers glabrous, not apiculate. *Gynoecium* glabrous; style and stigma together 0.75–1 mm long; stigma entire, minute, as wide or slightly wider than style. *Cocci* 2.5–3 mm long, 1.5–2 mm wide, glabrous. *Seed* dark brown to black, c. 2 mm long, c. 1 mm wide.

Additional specimens examined: Known from the type material only.

Notes: The species appears to be most closely related to *B. hippopala* from which it can be distinguished by the leaves being hispidulous on the proximal portion only (cf. hispidulous all over), weak habit, larger petals (4.5–5.5 mm long; cf. 3.5–4.5 mm long), smaller sepals (0.75–1.25 mm long; cf. 1–1.75 mm long) and glabrous styles and fruit (see also above). It can be distinguished from the geographically adjacent *B. citriodora* subsp. *orientalis* by the narrow leaflets (0.5–1 mm wide; cf. 1–2 mm wide) and small sepals (0.75–1.25 mm long, 0.25–0.5 mm wide; cf. 1.75–2 mm long, 1–1.25 mm wide). These characters, in addition to the hispidulous branches, also distinguish *B. hemichiton*

from *B. pilosa*. For further discussion on relationships of this species see the discussion under *B. hippopala* above.

Distribution and ecology: The species is known only from the western slopes of Mt Arthur in northern Tasmania (Fig. 11) where it was collected at 500 m in heath on the forest edge (collector's notes). Flowering and fruiting material was collected in December.

Conservation status: As *B. hemichiton* is known from the type collection only, which contains no notes regarding population size, a conservation code of 1K is appropriate. Urgent surveys are required to ascertain the conservation status of this taxon.

Etymology: The specific epithet is derived from the Greek, *hemi* (half) and *chiton* (covering), and alludes to the leaves which are only half covered by hairs.

25. *Boronia elisabethiae* Duretto, *sp. nov.*

A *Boronia citriodora* Gunn ex. Hook.f. habitu prostrata ad leniter erecta, foliis minoribus, petiolis brevioribus et foliolis terminalibus minoribus differt.

Type: TASMANIA: SOUTH WEST: c. 1 km along vehicle track to the expanded Lake Pedder; track leaving Scotty Rd just N of Condominium Ck, 42°57'S 146°21'E, *M.F. Duretto 834 and P.G. Neish*, 9.i.1996 (holotype MEL *2046925*; isotypes CANB, HO). (Figs 10 G-I).

Semi-erect to weakly spreading, woody *sub-shrub* to 20 cm tall and 50 cm wide. *Branchlets* not obviously glandular, leaf decurrencies absent, hispidulous, becoming glabrous with age, hairs to 0.1 mm long, branchlets sometimes developing adventitious roots. *Leaves* imparipinnate, 3–7(–9)-foliolate, entire leaf in outline 5–11(–15) mm long, 5–18 mm wide, not obviously glandular, glabrescent or sparsely hispidulous along midrib or hispidulous; petiole 1.5–3 mm long; rachis segments 1–3 mm long; terminal leaflets 2–8 mm long, 0.5–1 mm wide, narrowly elliptic to linear, concolorous, flat and dorsiventral to semiterete with palisade mesophyll almost to totally encircling leaflet, margins entire or very minutely serrate, tip acute; lateral leaflets similar to terminal leaflets but longer, 2–9(–11) mm long. *Inflorescence* terminal or axillary in upper axils, 1–3-flowered, not obviously glandular, hispidulous, usually longer than leaves; peduncles 1–4 mm long; prophylls 1–3.5 mm long; anthopodia 1.5–2 mm long; metaxyphylls 1–1.5 mm long. *Sepals* deltate, 1.5–3 mm long, 1–1.5 mm wide, not obviously glandular, adaxial surface puberulous towards apex or glabrous, abaxial surface hispidulous or glabrous. *Petals* white to pink, 3.5–6 mm long, adaxial surface sparsely pilose, abaxial surface hispidulous, hairs often appressed, tip with subterminal apiculum. *Staminal filaments* glandular tuberculate towards apex, margins and distal ends pilose but not densely so; anthers glabrous, not apiculate. *Gynoecium* glabrous; stigma entire or slightly divided, minute, slightly wider than style, stigma and style together 1–1.5 mm long. *Cocci* (fully mature not seen) c. 3 mm long, c. 1.5 mm wide, hispidulous. *Seed* (mature not seen) dark brown to black.

Representative specimens (c. 50 specimens examined): **TASMANIA**: WEST COAST: Near Franklin River and Cassiterite Ck, 41°13'S 144°52'E, *A. Moscal 4727*, 10.xii.1983 (AD, AK *n.v.*, HO); Mt Franklin, 41°17'S 144°55'E, *A. Moscal 5033*, 19.xii.1983 (AD, HO); 1 km NE of Strahan, 42°08'S 145°20'E, *A. Moscal 5274*, 6.i.1984 (HO); CENTRAL HIGHLANDS: 2.5 km W of Granite Tor, 42°44'S 145°44'E, *A.M. Buchanan 5477*, 22.i.1985 (HO); SOUTH WEST: Pine Cove Ck-Swift Ck, 42°14'S 145°27'E, *A. Moscal 5363*, 8.i.1984 (BRI *n.v.*, HO); South West NP, Scotts Peak Dam Rd, Condominium Ck crossing, 42°58'S 146°22'E, *S.J. Forbes 1255*, 21.ii.1983 (MEL); First saddle of the Needles, 42°40'S 146°28'E, *M.F. Duretto 822,* 9.i.1996 (HO, MEL); Long Plains, Savage River, 41°31'S 145°12'E, *W.D. Jackson 400*, 15.i.1954 (HO); Nelson Bay River, 41°16'S 144°52'E, *A. Moscal 4876*, 15.xii.1983 (HO, MEL); Sanctuary Bay, N side of Point Hibbs, 42°36'S 145°17'E, *A. Moscal 6054*, 1.ii.1984 (HO); Summit of Lawson Range, 42°57'S 145°41'E, *A.M. Buchanan 8133*, 25.ii.1986 (HO); Rocky ridge top, 1/3 of way along track to Mt Elisa, 42°58'S 146°23'E, *M.F. Duretto 826–828 and P. Neish*, 9.i.1996 (*MFD826*-MEL; *MFD827*-AD,

MEL; *MFD828*-HO, MEL); 1.5 km SSE of Elliot Hill, 43°01'S 145°38'E, *R. Buttermore 79*, 17.i.1986 (HO); 2 km SE of Federation Peak, 43°17'S 146°30'E, *A. Moscal 2120*, 9.iii.1983 (HO); Melaleuca, Port Davey, 43°25'S 146°09'E, *P. Brown s.n.*, 28.xi.1983 (HO *72214*).

Notes: *Boronia elisabethiae* is easily distinguished from other Tasmanian species by its weak stature, adventitious roots (also seen in *B. citriodora*), hispidulous stems, small leaves with very narrow leaflets, and long style. The species is often found near *B. citriodora* subsp. *paulwilsonii* from which it can be easily distinguished by the semierect to prostrate habit (cf. erect), and smaller leaves (5–11(–15) mm long; cf. 15–25 mm long) with narrower leaflets (0.5–1 mm wide; cf. 1.5–4 mm wide). Usually *B. elisabethiae* is found in more exposed situations while *B. citriodora* subsp. *paulwilsonii* is found in more sheltered positions such as near small stands of rainforest or tall scrub.

Some collections of *B. elisabethiae* (e.g. *Duretto 834* [type]) are made up of specimens with hispidulous leaves and sepals while most plants have glabrous or glabrescent leaves and sepals. Other collections (e.g. *Forbes 1255, Jackson 400, Moscal 240, Moscal 4727* [AD]) are made up of several plants and indicate that a population can contain both hispidulous and glabrescent plants. Other collections (e.g. *Moscal 4727* [HO]) contain plants that are hispidulous along the midrib of the leaflets only. The hispidulous plants are scattered throughout the distribution of the glabrescent plants and so this feature, though interesting, is not considered to be of taxonomic value.

Jarman *et al.* (1988) considered *B. citriodora* to be an indicator species of the eastern moor above 600 m of south western Tasmania and the central plateau. Plants they referred to in the south-west were probably *B. elisabethiae* which is often found at higher elevations and in more exposed areas (see also *B. citriodora* subsp. *paulwilsonii*).

Distribution and ecology: *Boronia elisabethiae* is confined to western Tasmania from sea level to 960 m (Fig. 11), where it is found in wet and dry conditions in button grass and sedge moorland, closed or open heath, and in mats of other species such as *Donatia novae-zelandiae* Hook.f. and *Oreobolus pumilio* R.Br. The species is usually found in exposed areas with poor and rocky or peaty soils. Flowering November-March; fruiting January-March.

Conservation status: The species appears secure as it is widespread, common where found, and present in a number of reserves.

Etymology: The species is named for Dame Elisabeth Murdoch, patron of the Royal Botanic Gardens Melbourne, for her generosity and support of the Royal Botanic Gardens Melbourne.

26. *Boronia subulifolia* Cheel, *J. & Proc. Royal Soc. New South Wales* 61: 402 (1928). *Type citation*: "Specimens in the National Herbarium, Sydney, are from Braidwood district, 3800 feet alt., collected by Mr. W. Bauerlen, and Currockbilly Mountain, near Braidwood (J.L. Boorman)." *Type*: Currockbilly Mountain, near Braidwood [New South Wales], *J.L. Boorman s.n.*, xii.1915 (lectotype, here designated, NSW *385695*); Currockbilly (Summit), near Braidwood [New South Wales], *J.L. Boorman s.n.*, iii.1909 (residual syntype NSW *385696*); Braidwood District, 3,800 ft [New South Wales], *W. Bauerlen No. 442*, ii.1885 (residual syntype NSW *385694*; residual isosyntype MEL *249147*); Braidwood District, 4,000 ft [New South Wales], *W. Bauerlen No. 58*, x.1886 (possible residual syntype MEL *249146* [Note: Mr W. Bauerlen collected for both Mueller and NSW and so Cheel possibly did not see these specimens]).

Illustrations: P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 234 (1991); P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 274 (2002).

Erect, woody *shrub* to 1.2 m high. *Branchlets* not obviously glandular, pilose, hairs usually evenly spread around branches but sometimes denser or only present between leaf decurrencies, becoming glabrous with age, hairs to 0.75 mm long; leaves and flowers often quite congested. *Leaves* imparipinnate, (3–)5–7(–13)-foliolate, entire leaf in outline

6–20 mm long, 4–26 mm wide mm wide, not obviously glandular, glabrous or glabrescent or pilose at leaflet nodes or sparsely to moderately pilose all over; petiole 1–4 mm long; rachis segments 2–8 mm long; leaflets linear or linear-oblong or linear-lanceolate, flat to subterete, concolorous, dorsiventral, palisade mesophyll almost encircling entire leaf, margins entire, tip acute; terminal leaflets similar to lateral leaflets, sometimes shorter, 2.5–15 mm long, 0.5–1 mm wide. *Inflorescence* terminal or axillary, 1(–3)-flowered, not obviously glandular, pilose, shorter or longer than leaves; peduncles to 1 mm long; prophylls 1–3 mm long, deltate; anthopodia 1–4 mm long. *Sepals* narrowly deltate, 2.5–4 mm long, 1–2 mm wide, not obviously glandular, adaxial surface glabrous, abaxial surface pilose to glabrescent, tip with sometimes prominent subterminal apiculum. *Petals* light to deep pink, 5–8 mm long, adaxial surface with a moderate cover of minute simple hairs, abaxial surface sparsely and minutely pilose to sparsely pilose, hairs concentrated along margins, usually caducous, tip with subterminal apiculum. *Staminal filaments* pilose below glandular tuberculate tip; anthers glabrous, apiculum absent or minute. *Ovary* glabrous; style pilose; stigma entire, minute, scarcely wider than style. *Cocci* 3–4.5 mm long, 1.5–2.5 mm wide, glabrous or with few hairs along suture. *Seed* black, c. 2 mm long, c. 1 mm wide. n=11 (Smith-White 1954; Stace *et al.* 1993; both as *B. pilosa* N.S.W. Eden).

Selected specimens examined (c. 30 collections examined): **NEW SOUTH WALES**: SOUTH COAST: Pigeon House Range, eastern side near Ettrema on Tomerong-Braidwood Rd, 35°05'S 150°15'E, *M.G. Corrick 7045*, 28.x.1980 (CANB, MEL); W end of the Castle (W of Mt Pigeon House), *A. Currie s.n.*, x.1954 (NSW *385691*); 3.5 km WSW of Mt Tianjara, 35°10'S 150°16'E, *L.G. Adams and K. Paijmans 3700*, 2.iii.1981 (CANB); northern Budawang Range, near Camping Rock, c. 13 km SE of Nerriga, 35°13'S 150°13'E, *A. Hughes 3*, 25.ix.1983 (AD, CANB, MEL); near Crooked Falls, c. 4 km NW of the Castle, 35°15'S 150°11'E, *P. Gilmour 5267*, 2.x.1980 (CANB, MEL); Monolith Valley, Budawang Range, 35°16'S 150°11'E, *I.R. Telford BR212*, 5.x.1971 (CANB); The Castle, Budawang Range, 35°17'S 150°12'E, *I.R. Telford s.n.*, 22.ix.1967 (CANB *CBG22097*); Yarraman Fire trail, near Tianjara Falls, 35°05'S 150°19'E, *P. Gilmour 5155*, 1.ix.1985 (CANB, NSW); Head of Clyde River, near Sassafras, *F.A. Rodway 1063*, 15.ix.1935 (NSW); SOUTHERN TABLELANDS: The Jumps, 'Touga' [34°58'S 150°05'E], *M. McMillan 72/78*, 11.xii.1972 (CANB); Mt Cole, Budawang Range, 35°16'S 150°11'E, *I.R. Telford 1440*, 6.x.1969 (CANB); Burrumbeet Brook near Mt Corang, 35°17'S 150°06'E, *J. Storey s.n.*, 9.ix.1973 (CANB); Ettrema Gorge, 25 miles [c. 40 km] SW of Nowra, *F.A. Rodway 14292*, 13.x.1946 (NSW); Karra Hill-Admiration Pt, *V.M. and C. Murtagh*, 28.x.1972 (NSW); Near Bainbrig Ck, near Touga turnoff, *T. and J. Whaite 3475*, 22.ii.1971 (NSW); Mt Rowaine, near Budawang Range, *I. Olsen 737,* 11.xi.1967 (NSW); Mt Elliott (Budawangs), *V. Murtagh s.n.*, 30.ix.1973 (NSW); 2 miles [c. 3.2 km] S of ridge from old sawmill to Folly Point (Clyde River area), *T. and J. Whaite 2948*, 23.x.1968 (NSW); Sallee Ck, 2 km SSW of Foster Mtn, c. 5 km SW on Endrick Trig., 35°13'S 150°10'E, *B.J. Briggs 47456*, 1973 (NSW); 2 km E of Round Hill, on a sandstone ridge, The Budawangs, *J. Armstrong 119*, 10.xii.1972 (NSW); Mt Currockbilly, Budawang Range, 21 km ENE of Braidwood, 35°24'S 150°02'E, *S.I. Parker 25*, 17.i.1978 (CANB); Summit of Mt Currockbilly, *R.A. Rodway 1064*, 2.i.1938 (NSW); Small peak just W of Mt Currockbilly, Moreton NP, 35°24'S 150°02'E, *M.F. Duretto 698*, *P. Neish and I. Thompson,* 30.x.1995 (CANB, MEL, HO).

Notes: *Boronia subulifolia* was once included in *B. pilosa* (see Cheel 1928) and can be distinguished from that species by the narrow, subterete leaflets (0.5–1 mm wide; cf. 1–4 mm wide, flat) and pilose sepals (cf. glabrescent to pilose). The specimens referred to *B. pilosa* by Smith-White (1954) and Stace *et al.* (1993) are referable to *B. subulifolia.* Furthermore, the records of *B. pilosa* in New South Wales (e.g. by Guilfoyle 1911; Black 1924, 1948; Willis 1973; Curtis & Morris 1975; Galbraith 1977) no doubt refer to *B. subulifolia.*

There is some variation in the indumentum density of the leaves of *B. subulifolia.* Plants from the northern part of the range near Ettrema Gorge (e.g. *Rodway 14292*) and Bainbrig Creek (*Whaite 3475*) have a fairly dense indumentum while a specimen from the nearby Jumps 'Touga' (*McMillan 72/78*) and populations from the southern parts of

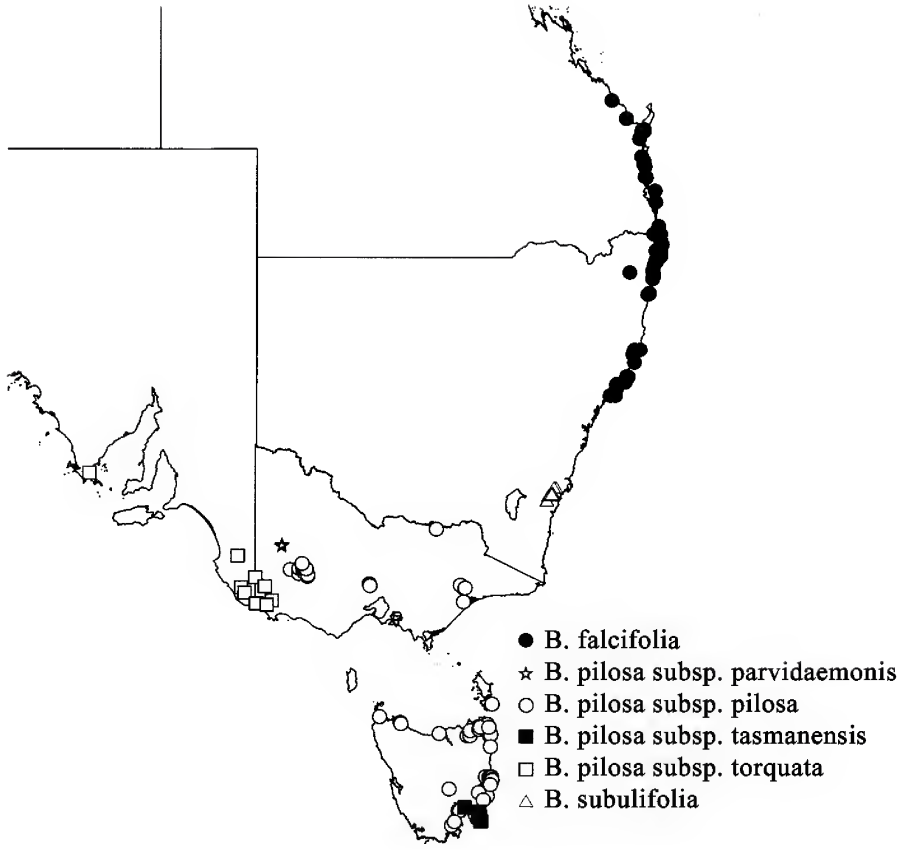

Figure 12. Distribution of *B. falcifolia*, *B. pilosa* subsp. *parvidaemonis*, *B. pilosa* subsp. *pilosa*, *B. pilosa* subsp. *tasmanensis*, *B. pilosa* subsp. *torquata*, *B. subulifolia*.

the range have a significantly less dense indumentum. Field research is required to ascertain if there is any taxonomic significance in this variation.

Horticultural notes on *B. subulifolia* are given by Elliot and Jones (1982).

Distribution and ecology: The species is confined to a small area centred on the Budawang Ranges, south-eastern New South Wales (Fig. 12). It is found in heath and dry sclerophyll woodland on rocky sandstone slopes. Flowering September-December; fruiting October-December.

Conservation status: The area in which *B. subulifolia* is found is less than 50 km across from north to south and 30 km from east to west. Most populations are found in Budawang and Moreton National Parks while others are in State Forests and on private property. The species is probably secure and a conservation code of 2RCa is appropriate (Leigh *et al.* 1981; Briggs & Leigh 1988, 1996; Walter & Gillett 1997).

Etymology: The specific epithet is referring to the shape of the leaflets: subulate (Cheel 1928).

27. *Boronia pilosa* Labill., *Nov. Holl. pl.* 1: 97, t. 124 (1805); *B. tetrandra* var. *pilosa* (Labill.) Hook., *J. Bot. (Hooker)* 2: 419 (1840); *B. pilosa* Labill. var. α, Hook.f., *Flora Tasman.* 1: 67 (1855); *B. pinnata* var. *pilosa* (Labill.) F.Muell., *The native plants of*

Victoria 1: 69 (1879). *Type citation*: "in capite Van-Diemen." *Type*: Nova Hollandia [Tasmania], *Labillardiere s.n.* (lectotype, here designated, K *n.v.* [right hand specimens with Tab 124 annotation; cibachrome MEL *2041270*, photograph AD *99803338*]); Australia, *Labillardiere s.n.* (possible isolectotypes MEL *259695* [ex BM]); cap. van Dieman, *Labillardiere s.n.* (possible isolectotypes TCD [far right hand sprig, transparency MEL *2068549*]).

["*Boronia pinnata*" *auct. non* Sm.: F. Mueller, *Pl. Victoria* 1: 115 (1860-1862), p.p.]

Illustrations: J.H. Labillardiere (*l.c.*); G.R. Cochrane, B.A. Fuhrer, E.D. Rotherham and J.H. Willis, *Flowers and Plants of Victoria and Tasmania* 34, t. 106, (1980), photograph; J.H. Willis, B.A. Fuhrer, and E.R. Rotherham, *Field Guide to the Flowers and Plants of Victoria* 46 (1975), photograph.

Erect, woody *shrub* to 1.5(–3, subsp. *pilosa*) m tall. *Branchlets* not obviously glandular, hispidulous or sparsely to densely pilose, evenly distributed or denser between leaf decurrencies (if present), hairs to 1 mm long. *Leaves* imparipinnate, 3–9-foliolate, entire leaf in outline 3–18(–22) mm long, 4–34 mm wide, not obviously glandular, glabrescent to pilose, subsessile or petiolate; petiole 0.5–3 mm long; rachis segments 0.25–4 mm long; terminal leaflets 1–13 mm long, 0.5–2.5(–4; Tas. - ssp's *tasmanensis*, *pilosa*) mm wide, linear or narrowly obovate or narrowly elliptic, semiterete to flat, discolorous, clearly dorsiventral (ssp's *pilosa, tasmanensis*) to semiterete with palisade mesophyll almost to entirely encircling leaflet (ssp's *parvidaemonis, pilosa, torquata*), margins not or slightly recurved, entire or minutely serrate towards apex, apex obtuse to acute; lateral leaflets similar to terminal leaflets but longer, 2–17 mm long, 0.5–2(–3; Tas. - ssp's *tasmanensis*, *pilosa*) mm wide. *Inflorescence* terminal or axillary, 1–10-flowered, shorter or longer than leaves; peduncles 0.5–2.5(–8) mm long, glabrescent to pilose; prophylls 0.5–4(–8) mm long, glabrous or glabrescent or ciliate, sometimes minutely pinnate, persistent; metaxyphylls 1–2 mm long; anthopodia 1–11 mm long, glabrescent to pilose. *Sepals* narrowly deltate to deltate, 1–5 mm long, 0.75–2 mm wide, not obviously glandular, adaxial surface glabrous to sparsely pilose with hairs concentrated towards apex, abaxial surface glabrous to pilose, often ciliate, tip with slight to prominent subterminal apiculum. *Petals* white to pink, 3–7(–8; subsp. *tasmanensis*) mm long, caducous, adaxial surface minutely pilose, abaxial surface glabrous to minutely pilose sometimes only along margins, minutely ciliate, tip with prominent subterminal apiculum. *Staminal filaments* glandular tuberculate towards apex, margins and distal ends sparsely to densely pilose, sometimes with a tuft of hairs at apex; anthers glabrous, not apiculate. *Ovary* glabrous (all subsp.) or hispidulous along sutures and at apex to densely hispidulous (subsp. *pilosa*, NE Tas. - Bicheno to Freycinet Pen.); style glabrous to pilose; stigma entire or rarely four lobed, significantly wider than style, sometimes concealing it, stigma and style together 0.4–0.75 mm long. *Cocci* 2–3.5 mm long, 1-2.5 mm wide, glabrous to pilose. *Seed* black, 1.5–2 mm long, 1–1.5 mm wide. (Figs 10 J-V). **Hairy Boronia**.

Notes: W.J. Hooker (1840) reduced *B. pilosa* to varietal status under *B. tetrandra* Labill. (a Western Australian species) and described a number of Tasmanian forms as varieties. J.D. Hooker (1855) reinstated *B. pilosa* and, though it is not explicitly stated, transferred two of Hooker's (1840) varieties, viz. var. *floribunda* and var. *laricifolia*, to *B. pilosa* and described a typical variety, var. α. J.D. Hooker (1855, p. 67) states "I have adopted Mr. Gunn's limitations of the varieties of this species. I cannot define them better than as above" indicating he was using Gunn's concepts. J.D. Hooker (1855) also indicated that var. α was from Recherche [close to the type locality of *B. pilosa*] and Port Arthur [domain of *B. pilosa* subsp. *tasmanensis*] *etc*, var. *floribunda* from Hobarton *etc* [close to the type locality], var. *laricifolia* from Circular Head, Woolnorth *etc* [NW Tas.].

Mueller (1860-1862) placed *B. pilosa* in synonymy under *B. pinnata*, later as a variety of that species (Mueller 1879), and then as a distinct species (Mueller 1885, 1887-88). Most relevant floras retain *B. pilosa* as a distinct species (e.g. Bentham 1863; Ewart 1931;

Black 1924, 1948; Curtis 1956; Willis 1973; Curtis & Morris 1975; Duretto 1999c). Rodway (1903) did not discuss variation in *B. pilosa* and stated it was close to *B. pinnata* if not a variety of it. Curtis (1956), in the Tasmanian Flora, recognised both *B. gunnii* and *B. pilosa* under which she included three varieties (viz. var's *pilosa*, *floribunda*, and *laricifolia*). Curtis and Morris (1975) adopted a broad view of *B. pilosa* that included *B. gunnii* and J.D. Hooker's (1855) varieties acknowledging that these require further study. Buchanan *et al.* (1989) and Buchanan (1995) list these three varieties of *B. pilosa* but they do not list *B. gunnii*. These three varieties were not recognised in the South Australian census (Jessop 1983, 1984, 1989, 1993), or by Armstrong and Telford (1986), in the *Flora of South Australia*, who stated that the distinguishing features of these varieties "intergrade imperceptibly". Variation in *B. pilosa* in Victoria is discussed by Willis (1973) who noted south-western Victorian forms with glabrous or glabrescent leaves (see subsp. *torquata*) approach the Tasmanian *B. pilosa* var. *floribunda.* Infraspecific taxa were not listed in the earlier censuses of Victoria (Forbes *et al.* 1984; Forbes & Ross 1988b; Ross 1990, 1993, 1996) though two subspecies were recognised later (Duretto 1999c; Ross 2000; see ssp's *pilosa, torquata* and *parvidaemonis*).

Here four subspecies are recognised and this classification is by no means definitive. The three subspecies in Victoria and South Australia (*viz.* ssp's *pilosa* [also in Tasmania], *parvidaemonis* and *torquata*) are easily identified. In Tasmania, the type subspecies is very variable and may prove, with further research, to contain a number of taxa. It is on this variation that the previously published varieties were based. In addition, the distinction between *B. pilosa* subsp.'s *pilosa* and *tasmanensis* is blurred by a few specimens at Eaglehawk Neck though most collections are easy to delegate to one or other subspecies. The populations of subsp. *pilosa* on Mt Amos and Mt Graham (Freycinet Peninsula) are problematic in that they consist of plants that show variation in leaflet width, and sepal size and shape. It may prove that these population are either intermediates between *B. pilosa* and *B. rozefeldsii* or part of an undescribed taxon. On Schouten Island *B. pilosa* and *B. rozefeldsii* are found in close proximity but they do not intergrade (pers. obs. 2002). These issues are further discussed under *B. pilosa* subsp. *pilosa*.

With the recognition of four subspecies within *B. pilosa*, the reinstatement of *B. gunnii* and the description of *B. elisabethiae, B. hippopala*, *B. hemichiton*, *B. rozefeldsii* and *B. citriodora* subsp. *paulwilsonii* (often identified as *B. pilosa*) it is hoped that some of the confusion surrounding *B. pilosa* has been removed or, at least, reduced. As already stated, the classification presented here is not definitive but it does offer a basis for classifying the species and for planning additional research. Further research, using detailed population studies and additional data sources such as molecular studies, is required to elucidate relationships between populations of this species, especially in Tasmania (see subsp. *pilosa*).

The *B. pilosa* (Eden) that was recorded by Smith-White (1954) and Stace *et al.* (1993) is probably referable to *B. subulifolia*. Horticultural notes on *B. pilosa* are given by Elliot and Jones (1982). They noted that a double-flowered form has adapted well to cultivation.

Distribution and ecology: *Boronia pilosa* is found in south-eastern South Australia, south-western (including the Little Desert and the Grampians) central and eastern Victoria and in northern and eastern Tasmania (Fig. 12). Guilfoyle (1911), Black (1924, 1948), Willis (1973), Galbraith (1977) and Curtis and Morris (1975) included New South Wales in their distributional data of *B. pilosa* and are probably referring to specimens of *B. subulifolia. Boronia pilosa* is found in heath, woodland or forest, on sandy and/or rocky soils. The species was found to be self incompatible by Weston *et al.* (1984). Flowering July-February; fruiting November-February.

Etymology: The epithet presumably refers to the often pilose stems and/or leaves of the species.

Key to the subspecies of B. pilosa

1. Leaflets glabrescent to pilose; branches pilose, hairs greater than 0.3 mm long, denser between leaf decurrencies or spread evenly around branch; sepals glabrous or ciliate or variously pilose; ovary glabrous to hispidulous 2
1: Leaflets glabrous or glabrescent or rarely hispidulous (and then leaves < 10 mm long); branches hispidulous, hairs mostly to 0.25 mm long, denser between leaf decurrencies; sepals glabrous or ciliate; ovary glabrous. 3
2. Sepals 1.5–3.5 mm long, glabrous or glabrescent or ciliate or sparsely pilose or rarely pilose or hispidulous; widest leaflets 0.5–2 mm wide; style usually pilose (N & E Tas., probably absent from Tasman & Forestier Pen's) ..... **27a.** subsp. ***pilosa***
2: Sepals 2.5–5 mm long, pilose (rarely sparsely pilose and then sepals 4–5 mm long); widest leaflets 2–4 mm wide (if widest < 3 mm wide then sepals 4–5 mm long); style glabrous or with few hairs (Tas. - Tasman & Forestier Pen's) ..... **27b.** subsp. ***tasmanensis***
3. Stigma shorter than glabrous or pilose style, style clearly visible, together greater than 0.5 mm long (Tas.) ..... **27a.** subsp. ***pilosa***
3: Stigma significantly larger than pilose style, style often concealed, together to 0.5 mm long (SA; Vic.; Tas.) 4
4. Larger leaves > 10 mm long; larger leaflets > 9 mm long, flat; petiole 1–3 mm long (SA; SW Vic.) ..... **27c.** subsp. ***torquata***
4: Leaves < 10 mm long; leaflets < 9 mm long, flat to semiterete; petiole to 1 mm long (Vic. - Little Desert; Tas.) 5
5. Sepals narrowly deltate, 0.5–0.75 mm wide; leaflets glabrous (Tas.) ..... **27a.** subsp. ***pilosa***
5: Sepals deltate, mostly c. 1 mm wide; leaflets glabrous to hispidulous (Vic. – Little Desert) ..... **27d.** subsp. ***parvidaemonis***

27a. *Boronia pilosa* Labill. subsp. ***pilosa***

Boronia tetrandra var. *floribunda* Hook., *J. Bot. (Hooker)* 2: 419 (1840); *B. pilosa* var. *floribunda* (Hook.) Hook.f., *Flora Tasman.* 1: 67 (1855). *Type citation*: "Gunn, 665." *Type*: Hobart [Tasmania], *R. Gunn 665*, 20.xi.1839 (lectotype, here designated, K *n.v.* [cibachrome MEL *2041271*]; isolectotype CANB *259057,* HO *4661*; possible isolectotype NSW *385770*).

Boronia tetrandra var. *terminiflora* Hook., *J. Bot. (Hooker)* 2: 419 (1840). *Type citation*: "Mr. Gunn (n. 790)". *Type*: ?. [NOTE: Hooker (*l.c.*) cites *Gunn 790* for specimens seen for both this taxon and *B. tetrandra* var. *laricifolia* though he adds "Circular Head, &c." to the information of the latter. It is assumed that he did not use the same material for the two taxa (described a few lines apart). Apart from the Circular Head material cited below, no other specimens of *Gunn 790* have been seen by the author. Hooker f. (1855) does not list *B. tetrandra* var. *terminiflora*.]

Boronia tetrandra var. *laricifolia* Hook., *J. Bot. (Hooker)* 2: 419 (1840); *B. pilosa* var. *laricifolia* (Hook.) Hook.f., *Flora Tasman.* 1: 67 (1855); *Type citation*: "Mr. Gunn (n. 790)." *Type*: [Circular Head,] V. D. Land [Tasmania], *R. Gunn 790* [16.xi.1836] (lectotype, here designated, K *n.v.* [cibachrome MEL *2041274*, photo AD *99548090*]).

Boronia pilosa subsp. 1: M.F. Duretto, *Fl. Victoria* 4: 162 (1999), p.p.; J.H. Ross, *A Census of the Vascular Plants of Victoria, 6th edn*, 110, 138 (2000), p.p.

Illustrations: J.H. Labillardiere (*l.c.*), as *B. pilosa*; H.J. King and T.E. Burns, *The Wildflowers of Tasmania* 19 (1969), as *B. pilosa*, photograph; P. Collier, *Woodland Wildflowers of Tasmania* 28 (1990), as *B. pilosa*; I.R. McCann, *The Grampians in Flower*, 100 (1994), photograph, as *B. pilosa*; M.F. Duretto, *Fl. Victoria* 4: 163, Fig. 29e (1999), as *B. pilosa* subsp. 1; M.G. Corrick and B.A. Fuhrer, *Wildflowers of Victoria* 206 (2000), as *B. pilosa*, photograph.

Erect *shrub* to 1.5(–3, Vic. - East Gippsland) m tall. *Branchlets* hispidulous (N Tasmania) or sparsely to densely pilose, indumentum evenly distributed or denser between faint leaf decurrencies, hairs to 1 mm long, longest hairs usually > 0.25 mm long. *Leaves* 3–9-foliolate, entire leaf in outline 3–18 mm long, 4–34 mm wide; petiole 0.5–3 mm long, ciliate or glabrescent to pilose; rachis segments 0.25–3.5 mm long, proximal segments often much shorter than distal ones giving the lower leaflets a congested appearance, glabrescent to pilose; terminal leaflets (1–)1.5–11 mm long, 0.5–2(–2.5, Tas. - Mt Graham, Mt Amos) mm wide, linear or narrowly obovate or narrowly elliptic, semiterete to flat or with slightly recurved margins, clearly dorsiventral or sometimes palisade mesophyll almost to entirely encircling leaflet, glabrescent to pilose, tip acute; lateral leaflets 2–15 mm long, 0.5–2(–2.5, Tas.) mm wide. *Inflorescence* terminal or axillary, 1–9-flowered, glabrescent to pilose, shorter or longer than leaves; peduncles 0.5–2.5(–5) mm long; prophylls 0.5–4(–8) mm long, glabrous or ciliate; anthopodia 1.5–11 mm long. *Sepals* narrowly deltate to deltate, 1–3.5 mm long, 0.75–1.5 mm wide, abaxial surface glabrous or glabrescent to sparsely pilose to pilose, often ciliate. *Petals* pink, 3–6(–7, Tas. - Mt Amos, Mt Graham) mm long, abaxial surface minutely pilose sometimes only along margins, minutely ciliate. Staminal filament margins and distal ends pilose to densely pilose, sometimes with a tuft of hairs at apex. *Ovary* glabrous (Vic., Tas.) or hispidulous along sutures and at apex to densely hispidulous (Tas. - Bicheno to Freycinet Pen.); style glabrous to pilose, hidden by stigma or to 0.6 mm long; stigma significantly wider than style. *Cocci* 2–3.5 mm long, 1–2 mm wide, glabrous to pilose. *Seed* 1.5–2 mm long, 1–1.5 mm wide. (Figs 10 J-O).

Representative specimens (c. 250 specimens examined): **VICTORIA**: GRAMPIANS: Black Range, *J.W. Audas s.n.*, x.1929 (MEL *2100506*); c. 0.5 km S of Boroka Lookout on Mt Difficult Rd, 37°08'S 142°30', *B.J. Conn 3031*, 9.xi.1988 (CANB, MEL, NSW); eastern slopes of Boronia Peak, *T.B. Muir 829*, 25.ix.1959 (MEL); Summit of Mt William, *T.B. Muir 4789*, 10.xii.1969 (MEL); MIDLANDS: Coimadai, 37°34'S 144°32'E, *V. Stajsic 309 and S. Spence*, 21.viii.1991 (CANB, MEL, NSW); Wombat Forest, on bush road to Hogan's Flat (c. 2 miles [c. 3.2 km] N of Lerderderg Gorge opp. Mt Blackwood), *J.H. Willis s.n.*, 13.x.1963 (MEL *2100507*); EASTERN HIGHLANDS: On Tabberabbera Rd, c. 1 km SE of Burnett Ck Track, c. 16 km N of Flaggy Ck (town), *P.K. Gullan 328*, 23.viii.1978 (MEL); GIPPSLAND PLAIN: Near Bengworden, between Lake Wellington and the Prince's Hwy at Delvin, *W. Cane s.n.*, 27.v.1955 (MEL *2100500*); RIVERINA: Chiltern near the Murray River, *H.B. Williamson 8*, 1894 (MEL); **TASMANIA**: FURNEAUX GROUP: Behind Kent Bay, 40°26'S 148°20'E, *P. Cullen s.n.*, 10.xii.1989 (HO *410455*); NORTH WEST: Mouth of Marcus River (between Montagu and Woolnorth), 40°44'S 144°50'E, *A.M. Buchanan 8866*, 26.xii.1986 (HO); Rocky Cape NP Rd, on track to Forwards Beach, 40°52'S 145°29'E, *C. Palzer 43*, 11.vii.1985 (HO); Between Asbestos Range and Flowers Hill, 2.4 km WNW along track which intersects with Asbestos Rd, 41°08'S 146°42'E, *F.E. Davies 1050 and P. Ollerenshaw*, 19.i.1989 (AD *n.v.*, CANB *n.v.*, HO, MEL *n.v.*); WEST COAST: Macquarie Heads, 41°11'S 145°16'E, *A. Moscal 5451*, 10.i.1984 (HO); NORTH EAST: Cube Rock, SE slopes of Mt Cameron, 40°59'S 147°58'E, *A. Moscal 4096*, 16.xi.1983 (HO); Bayleys Hill, 40°59'S 148°14'E, *A. Moscal 2735*, 1.ix.1983 (HO); Picketts Plain, 41°02'S 147°56'E, *A. Moscal 3979*, 12.xi.1983 (HO, MEL *n.v.*); Speck Rd, 15 km NE of Scottsdale, 41°04'S 147°39'E, *A.M. Buchanan 4463*, 15.xi.1984 (HO); Near Tonganah Clay Mine, 41°11'S 147°34'E, *A.M. Buchanan 5063*, 21.xii.1984 (HO); N of Seal Lagoon – Bay of Fires, 42°08'S 148°16'E, *P. Collier 705*, 21.ix.1985 (HO); Scamander Nature Reserve, 41°26'S 148°17'E, *M.F. Duretto 845-847 and P.G. Neish*, 12.i.1999 (MEL); EAST COAST: Just above dam on water coarse near junction of the Lighthouse road with the main park road, Freycinet NP, 42°08'S 148°18'E, *M.F. Duretto 848-850,* 12.i.1996 (*MFD848-849* - MEL; *MFD850* - HO, MEL); c. 1/2 way along the coastal track from car park to Hazards Bay, Freycinet NP, 42°09'S 148°15'E, *M.F. Duretto 836-838 and P. Neish*, 11.i.1996 (MEL); N end of Freycinet Peninsula on cliff tops above Sleepy Bay, 42°08'S 148°19'E, *A.E. Orchard 5438*, 7.xi.1981 (HO); Top of Mt Amos, Freycinet NP, 42°09'S 148°18E, *M.F. Duretto 839-844 and P. Neish*, 11.i.1996 (*MFD839-840* – MEL; *MFD841-844* – HO, MEL); Mt Amos, Freycinet Peninsula, *M.E. Phillips s.n.*, 31.i.1962 (CANB *34797*); Mt Graham, Freycinet Peninsula, 42°12'S 148°19'E, *A.M. Buchanan 7212*, 13.viii.1985 (HO); East of Mt Graham, 42°13'S 148°18'E, *A.C. Rozefelds 302, 304-305, 307-308*, 17.x.1996 (HO); Gates Bluff heaths,

Freycinet Peninsula, 42°13'S 148°20'E, *A.M. Buchanan 10649*, 29.xii.1987 (HO); Gates Bluff, Freycinet Peninsula, 42°13'S 148°20'E, *A.M. Buchanan 10698*, 29.xii.1987 (HO); Top of ridge, NE corner of Schouten Is., 42°19'S 148°17'E, *A.C. Rozefelds 1975*, 15.xi.2000 (HO); Schouten Is., on track to Bear Hill, 42°18'S 148°17'E, *M.F. Duretto 1472-1474*, *A.C. Rozefelds,* and *A. Griffin*, 26.ii.2002 (MEL, HO); Schouten Is., on ridge east of falls on Chinese Ck, c. 42°19'S 148°17'E, *M.F. Duretto 1482-1487*, *A.C. Rozefelds,* and *A. Griffin*, 27.ii.2002 (MEL); Mt Nelson, 42°55'S 147°20'E, *E. Rodway 148*, 15.vii.1931 (HO); Waterworks Gully, 42°55'S 147°17'E, *F.H. Long 713*, 10.x.1931 (HO); 2.9 km along Randall Bay Rd from Channel Hwy (0.5 km after Randall Bay), SW of Hobart, 43°15'S 147°07'E, *M.F. Duretto 733-738, A. Jensz and A. Rozefelds*, 23.xii.1995 (*MFD734, 736-738* – MEL; *MFD733, 735* - MEL, HO)Road to Lady Bay, 43°25'S 147°00'E, *J. Sommerville s.n*, 6.xii.1958 (HO *4686*); Eaglehawk Neck, 43°01'S 147°55'E, *J. Sommerville s.n.*, 20.xi.1945 (HO *4654* [locality doubtful, see discussion under subsp. *tasmanensis*]).

Notes: *Boronia pilosa* subsp. *pilosa* displays some striking variation over its range and most of this variation concerns the hairiness of various organs and hair length (Figs 10 J-O), but leaf and perianth size are also variable. The stems are usually distinctly pilose with hairs >0.25 mm long but most, but not all, plants in northern Tasmania and Mt Amos (Tas. - Freycinet Pen.), and scattered plants elsewhere in Tasmania have hispidulous stems (hairs < 0.25 mm long). The plants with hispidulous stems usually have larger leaves (>10 mm long) than Victorian and most Tasmanian plants, and correspond to *B. pilosa* var. *laricifolia* (in synonymy above). This form is similar to ssp's *parvidaemonis* and *torquata* but lacks the distinctive short and pilose style of those subspecies.

The leaves of subsp. *pilosa* can be densely pilose (Vic. - The Grampians; SE Tas.; Fig. 10 K) to glabrescent or glabrous (most plants north of Freycinet Peninsula; Fig. 10 M). Plants from the eastern ranges of the Grampians tend to have hairier leaves and sepals than those from Victoria Range, to the west, but the variation appears to be continuous. Sepal hairiness (glabrescent to pilose) and length (1–3 mm long) is also variable in the Grampians. Plants with variously pilose sepals can also be found in northern Tasmania (e.g. *Cullen s.n.* HO *410455*, *Duretto 845-846, Moscal* 4096, *Moscal 2735*) and on Freycinet Peninsula (*Buchanan 10698*). Most other plants have ciliate or glabrous sepals.

The ovary can be variously hispidulous in north-eastern Tasmania (e.g. *Buchanan 10698, Duretto 845-847, Rozefelds 1975*) while most plants, including other plants in the north-east, have glabrous ovaries (Fig. 10 O). Plants with hispidulous ovaries also have small leaves and often the styles are shorter than the stigma. Fruit can be glabrous to pilose in this area and in the Grampians.

The populations on Mt Amos and Mt Graham (Tas. - Freycinet Pen.) are problematic in that they show some variation and may prove to be intermediate between *B. pilosa* and *B. rozefeldsii.* Most collections from these areas (e.g. *Duretto 839-841, 843, 844*; *Rozefelds 307-308*) have narrow leaflets much like the remainder of subsp. *pilosa* though others (e.g. *Buchanan 7212*; *Duretto 842*; *Rozefelds 302, 304, 305*) have short leaflets that are up to 2.5 mm wide and elliptic in shape (cf. narrowly elliptic to linear). The Mt Amos plants are also variable in petal (4.5–7 mm long) and sepal (1–2 mm long) length. On some specimens the sepals are deltate (*Duretto 839*, *Phillips s.n.* CANB *34797*; cf. narrowly deltate). Most of the material from Mt Amos also has hispidulous stems while plants in heath or swamps on or near Freycinet Peninsula, including Schouten Is. (*Duretto 1472-1474, 1482-1487, Rozefelds 1975*), around the Hazards (*Duretto 836-838*), and on Mt Graham (*Rozefelds 307, 308*), have the typically small, often pilose, leaves (to 10 mm long) and pilose stems. The deltate sepals and hispidulous stems approach that found in *B. citriodora.* Further detailed research is required to determine the taxonomic status of the populations on the Hazards and around Mt Graham. The typical form of *B. pilosa* (with small leaves and pilose stems) is found on Schouten Island near to but not with *B. rozefeldsii* and the species do not intergrade (pers. obs. 2002).

Plants of *B. pilosa* usually only reach 1.5 m in height though a collection from East Gippsland (Vic., *Cane s.n.*, MEL *2100500*) was made from a plant 2.5 m tall (see also Galbraith 1971; Elliot & Jones 1982).

Distribution and ecology: *Boronia pilosa* subsp. *pilosa* occurs in Victoria, where it is found in the Grampian Ranges and Portland areas, the Bacchus Marsh-Daylesford area, and near Bairnsdale, and in northern and eastern Tasmania (Fig. 12). It is found growing in forest, woodland and heath usually on sandstone or granite, or sandy soils from sea level (Tas.) to over 1100 m (Vic. - The Grampians). The collection from Chiltern, Victoria (*Williamson 8*) requires confirmation. Flowering August-February; fruiting November-February.

Conservation Status: The subspecies is widespread and found in a number of reserves across its range though it appears to be rare or threatened in East Gippsland, Victoria (see also Galbraith 1971). The taxon appears to be susceptible to *Phytophora cinnamomi* (see *Palzer 43*: collection notes indicate that most plants in area affected or killed by *P. cinnamomi*).

27b. *Boronia pilosa* subsp. ***tasmanensis*** Duretto *subsp. nov.*

A varietate typica foliolis latioribus, sepalis pilosis longioribus et ramis dense pilosis (pilis ad 1 mm longos) differt.

Type: TASMANIA: EAST COAST: Cape Hauy, Tasman Peninsula, 43°09'S 148°00'E, *G. Kantvilas 13 and S.J. Jarman*, 17.xi.1979 (holotype HO *31677*; isotypes AD *98241193*, AK *n.v.*, CHR *n.v.*, BAA *n.v.*, WELT *n.v.*) (Figs 10 T-V).

Erect *shrub* to 1.5 m tall. *Branchlets* pilose, sometimes denser between leaf decurrencies, without or with faint (Eagle Hawk Neck area) leaf decurrencies, hairs to 1 mm long. *Leaves* (3–)5–7(–9)-foliolate, entire leaf in outline 7–15(–22, Eaglehawk Neck area) mm long, 10–22(–34, Eaglehawk Neck area) mm wide; petiole 0.5–1.5(–2.5, Eaglehawk Neck area) mm long, pilose if only on the adaxial surface; rachis segments 0.5–2.5(–4, Eaglehawk Neck area) mm long, proximal segments pilose if only on adaxial surface, more distal segments often glabrescent; leaflets glabrous or glabrescent or ciliate or pilose and then usually only on adaxial surface, proximal leaflets more hirsute than more distal leaflets and hairs often concentrated on more proximal parts of leaflets; terminal leaflets 3–9(–13, Eaglehawk Neck area) mm long, 1–2.5(–4) mm wide, narrowly elliptic to narrowly obovate or rarely obovate, flat, dorsiventral; lateral leaflets 5–10(–17, Eaglehawk Neck area) mm long, 1–3 mm wide. *Inflorescence* axillary, 1–3(–10, Eaglehawk Neck area)-flowered, pilose, shorter to longer than leaves; peduncles 0.5–1(–8, Eaglehawk Neck area) mm long; prophylls 1.5–4 mm long; anthopodia 2–7 mm long. *Sepals* narrowly deltate, 2.5–5 mm long, 1–2 mm wide, abaxial surface pilose or rarely sparsely pilose (Devils Kitchen area). *Petals* white to pink, 4–8 mm long, abaxial surface minutely pilose along margins and sometimes sparsely pilose towards apex (Eaglehawk Neck area). Filament margins and distal ends pilose but not densely so. *Ovary* glabrous; style glabrous or with few hairs, stigma not significantly wider than style, together c. 0.75 mm long. *Cocci* 2.5–3.5 mm long, 1–2.5 mm wide, glabrous. *Seed* 1.5–2 mm long, 1–1.25 mm wide.

Representative specimens (c. 35 specimens examined): **TASMANIA**: EAST COAST: Cape Hauy, Tasman Peninsula, 43°09'S 148°00'E, *M.F. Duretto 749-751*, 3.i.1996 (*MFD749* – CANB, MEL; *MFD750* – NSW, MEL; *MFD751*- AD, HO, MEL); Cape Hauy – Fortescue Bay track, midway, 43°09'S 147°59'E, *A.E. Orchard 5169*, 12.1980 (AD, AK *n.v.*, HO, MEL); Tasman peninsula, approximately half way to Cape Hauy from Fortescue Bay, 43°09'S 148°00'E, *M.F. Duretto 743, 745-748,* 3.i.1996 (*MFD743, 745-747* – MEL; *MFD748* – HO, MEL); Tasman Peninsula, track running south from Devils Kitchen, 43°02'S 147°57'E, *M.F. Duretto 752-755*, 3.i.1996 (*MFD753* – AD, HO, MEL; *MFD753-755* – MEL); Tasman Peninsula, along firetrail to the north of Tasman Arch, 43°03'S 147°58'E, *M.F. Duretto 756-760,* 3.i.1996 (MEL); Devils Kitchen, Tasman Arch area, 43°03'S 147°58'E, *J. Armstrong s.n.*, 16.v.1976 (HO, NSW); Pirates Bay, near Eaglehawk Neck, c. 43°–'S 147°57'E, *J.H. Hemsley 6193*, 22.ix.1967 (HO, NSW); Eaglehawk Neck, Tasman Peninsula, 43°01'S 147°55'E, *W.H. Clemes s.n.*, ix.1932 (HO *92391*); *ibid*, *J.M. Powell 548*, 16.v.1976 (HO, NSW); Eaglehawk Neck, c. 45 km SE of Hobart, *J.B.*

Cleland s.n., 24.i.1928 (AD *96319076*); Blow Hole, near Eaglehawk Neck, *M.E. Phillips 525*, 12.xi.1960 (CANB); Murdunna, *J. Sommerville s.n.*, 16.ix.1957 (HO *4647*); Near Murdunna, *A.V. Giblin s.n.*, 23.x.1929 (CANB *5453*, HO *4676*); Richardsons Rd near Blackman Rivulet, Fazackerley Range, 42°56'S 147°57'E, *A. Strappazon AM10962*, 29.v.1985 (HO); Pittwater, 42°50'S 147°30'E, *A.V. Giblin s.n.*, 15.x.1929 (HO *4640*); Huon Rd, 42°55'S 147°15'E, *W.A. Tobias s.n.*, x.1958 (HO *92392*).

Notes: *Boronia pilosa* subsp. *tasmanensis* differs from *B. pilosa* subsp. *pilosa* by the wide leaflets (1–4) mm wide; cf. 0.5–2.5), pilose and larger sepals (2.5–5 mm long; cf. glabrous to pilose, 1–3.5 mm long) and densely pilose stems (glabrescent to pilose) with hairs to 1 mm long (cf. to 0.75 mm long), glabrous or sparsely pilose style (cf. mostly pilose) and sparsely to moderately pilose staminal filaments (cf. mostly pilose). The large, pilose sepals also distinguish subsp. *tasmanensis* from the other subspecies.

The leaflets of plants from more exposed areas (e.g. Cape Hauy) are glabrescent while in sheltered areas they can be pilose and/or ciliate. Populations can contain both ciliate and glabrescent leaved plants (e.g. *Duretto 752-755*, Eaglehawk Neck area). The leaflets of plants in exposed areas are usually also the widest. Plants from the Eaglehawk Neck area (e.g. *Clemes s.n.*, *Curtis s.n.* [HO *29751*], *Rodway s.n.*) can have larger leaves (to 22 mm long), and inflorescence parts (peduncles to 8 mm long) than other plants as well as having faint leaf decurrencies. In addition, some plants (e.g. *Clemes s.n.*, *Curtis s.n.* [HO *29751*], *Curtis s.n.* [HO *4648*]) have petals that are sparsely pilose at the tips abaxially. Glabrescent sepals and narrow leaves are seen on some plants in the Fazackerley Range (e.g. *Strappazon AM10962*) and Devils Kitchen areas though these all have long sepals (4–4.5 mm long) which distinguish them from subsp. *pilosa*. Though this variation is considered here to be of little taxonomic value, population studies of plants in this area would be of interest (see also *Conservation status*). The few collections seen of subsp. *pilosa* from the Forestier and Tasman Peninsulas with glabrous and small sepals (e.g., *Sommerville s.n.,* HO *4654*, see *B. pilosa* subsp. *pilosa*) were also collected from Eaglehawk Neck and require confirmation.

Distribution and ecology: *Boronia pilosa* subsp. *tasmanensis* is endemic to the Tasman and Forestier Peninsulas of eastern Tasmania where it is known from five areas: Murdunna and the Fazackerley Range of the Forestier Peninsula, the Eaglehawk Neck area, and on the Tasman Peninsula in the Tasman Arch/Devil Kitchen area, half way between Cape Hauy and Fortescue Bay and near the tip of Cape Hauy (Fig. 12). This subspecies is usually found growing in dense or open, usually wet heath or woodland. The collections from Huon Road (*Tobias s.n.*) and Pittwater (*Giblin s.n.*) require confirmation. Flowering September-January; fruiting November-January.

Conservation status: *Boronia pilosa* subsp. *tasmanensis* appears to be secure in the Tasman Peninsula National Park though it is known from few populations and these are of limited extent (pers. obs.). The most recent collection from Eaglehawk Neck was made in 1976. Further field work is required to accurately determine the extent of the known populations on the Tasman Peninsula and whether it occurs elsewhere on that peninsula. Only three collections have been seen from the Forestier Peninsula, with the latest being made in 1985 but the other two (from Murdunna) being made in 1929 and 1957. These areas warrant special attention to determine if the taxon is secure on the Forestier Peninsula. A conservation code of 2VC- is appropriate as most known populations are in well-visited tourist areas.

Etymology: *Boronia pilosa* subsp. *tasmanensis* is named after the peninsula to which most populations are confined.

27c. *Boronia pilosa* subsp. ***torquata*** Duretto, *subsp. nov.*

A varietate typica ramis hispidulis, foliis glabratis vel glabris, sepalis minoribus deltatis et glabris, et stylo per stigmam magnam celato differt; a *Boronia pilosa* subsp. *parvidaemonis* Duretto foliis longioribus differt.

Type: VICTORIA: WANNON: Lower Glenelg NP, Nelson North Rd, 5 km N of Nelson township, 38°00'S 141°01'E, *N.G. Walsh 3088*, 27.ix.1991 (holotype MEL *2013336*; isotypes CANB *449417*, BRI *n.v.*, PERTH *n.v.*). (Fig. 10 P).

Boronia pilosa Labill.: J.M. Black, *Fl. S. Austral.* 2: 338 (1924); J.M. Black, *Fl. S. Austral.* 2nd edn 2: 494 (1948); J.A. Armstrong and I.R. Telford, *Fl. S. Australia* 2: 771 (1986).

Boronia pilosa subsp. 2: M.F. Duretto, *Fl. Victoria* 4: 162 (1999), p.p.; J.H. Ross, *A Census of the Vascular Plants of Victoria, 6th edn*, 110, 138 (2000), p.p.

["*Boronia pinnata*" *auct. non* Sm.: R. Tate, *Handb. fl. extratrop. S. Australia*, 23 & 209 (1890)]

Illustration: M.F. Duretto, *Fl. Victoria* 4: 163, Fig. 29f (1999), as *B. pilosa* subsp. 2.

Erect *shrub* to 50 cm tall. Branchlets sparsely to moderately densely hispidulous, hairs confined to area between leaf decurrencies, hairs to 0.25 mm long, rarely slightly longer (Vic. - Portland area). *Leaves* 3–7-foliolate, entire leaf in outline 5–15 mm long, 10–30 mm wide; petiole 1–3 mm long, minutely ciliate, sometimes sparsely so; rachis segments 1–3 mm long, segments equal or proximal segments larger, sparsely hispidulous adaxially; terminal leaflets 4–10 mm long, 1–2 mm wide, linear to narrowly elliptic to narrowly obovate, flat to semiterete, palisade mesophyll encircling leaflet, glabrous, glabrescent or sparsely hispidulous; lateral leaflets 4–15 mm long, 0.5–1.5 mm wide. *Inflorescence* axillary and terminal, 1–9-flowered, slightly shorter to longer than leaves; peduncles 0.5–1.5 mm long, glabrous or sparsely hispidulous between decurrent bract bases; prophylls 1–1.5 mm long, sometimes minutely pinnate, glabrous; anthopodia 2.5–8 mm long, glabrous to sparsely hispidulous. *Sepals* deltate, 1.25–1.75 mm long, 1–1.5 mm wide, glabrous or minutely ciliate. *Petals* 3–5 mm long, abaxial surface minutely pilose along margins. Staminal filament margins and distal ends pilose. *Ovary* glabrous; style pilose or rarely glabrous (SA - *Donner 8480*), stigma significantly larger than style, together to 0.5 mm long. *Cocci* c. 2.5 mm long, c. 1.5 mm wide, glabrous or rarely sparsely pilose (SA - Penola). *Seed* c. 2 mm long, c. 1 mm wide.

Representative specimens (c. 65 specimens examined): **SOUTH AUSTRALIA**: EYRE PENINSULA: Port Lincoln – southern part of E.P., *anon*, ix.1927 (AD *9630614*); SOUTH EASTERN: Fairview Reserve (c. 35 km WNW of Naracoorte), 36°49'S 140°25'E, *G. Gardiner s.n.*, 1977 (AD *97751063*); c. 1 km W of Victorian Border on Penola-Dergholm Rd, 37°21'S 140°58'E, *P.J. Lang 8484*, 17.viii.1989 (AD, MEL); Penola, *C.G. Stephens s.n.*, 11.xi.1938 (AD *98585518*); 5 miles (c. 8 km) from Penola, on Casterton Rd, c. 50 km N of Mt Gambier, *V. Petherick s.n.*, 7.x.1933 (AD *96301072*); Marshes Swamp, 37°36'S 140°31'E, *N.N. Donner 8480*, 1.ix.1981 (AD); Hundred of Young, Section 5, 'Honans Scrub', c. 10 km N of Mt Gambier, *B.J. Blaylock 2247*, 10.x.1976 (AD, MEL); Honans Scrub Reserve, Mt Gambier Forest, 37°44'S 140°38'E, *N.N. Donner 9458*, 21.x.1982 (AD); c. 15 km W of Windilo, *I.B. Wilson 517* (AD, CANB); c. 25 km SE of Mt Gambier, Section 603, Hd. of Caroline, Glenelg River Reserve, 38°00'S 140°59'E, *A.C. Beauglehole SEFN 254* (AD); **VICTORIA**: WANNON: Tullich Rd, c. 12 km E of Casterton, 37°35'S 141°16'E, *M.G. Corrick 8486*, 1.xi.1982 (HO, MEL); Wilken, 12 miles [c. 15.2 km] SW of Casterton, and just W of the Glenelg R., *H.I. Aston 797*, 23.x.1960 (MEL); Crawford R. Boulevard, c. 11 km by road NW of Hotspur, 37°56'S 141°29'E, *M.G. Corrick 8507*, 2.xi.1982 (MEL); The Inkpot, c. 7 km S of Drik Drik, 38°02'S 141°19'E, *P.S. Short 3282 et al.*., 28.ix.1988 (MEL); Heath Rd, Lower Glenelg NP, 38°00'S 140°59'E, *R.J. Fletcher 187 and S. Howard*, 17.ix.1993 (MEL); Alcoa of Australia private land, Point Danger, S of Portland, 38°24'S 141°38'E, *D.E. Albrecht 1077*, 13.x.1984 (MEL); Wrights Swamp near Portland, *J.H. Willis s.n.*, 12.x.1960 (MEL).

Notes: *Boronia pilosa* subsp. *torquata* differs from the type variety by the hispidulous stems, glabrescent to glabrous leaves, sepals being smaller (0.5–1 mm long; cf. 1–3.5 mm long), deltate and glabrous, and the style being obscured by the large stigma (Fig. 10 P), and from subsp. *parvidaemonis* by the larger leaves (> 10 mm long; cf. < 10 mm long). Willis (1973) was referring to this subspecies when he discusses the glabrous or glabrescent leaved plants of south-western Victoria.

Populations in the Portland area, and in particular from the Mt Richmond and Gorae West areas, appear to have plants of both subsp. *torquata* and subsp. *pilosa*. These plants often have narrowly deltate sepals, long styles, and some have branch hairs to 0.5 mm long. Detailed local surveys would be interesting to determine if these subspecies form distinct or mixed populations.

In most specimens the fruit is glabrous or glabrescent though some specimens (e.g. *Stephens s.n.*, AD *98585518*; *Petherick s.n.*, AD *96301072*) from near Penola (SA) have sparsely to moderately densely hirsute fruit. These can be distinguished from *B. pilosa* subsp. *pilosa* by the short branch hairs, glabrescent leaves (see key) and deltate sepals.

Distribution and ecology: The subspecies occurs in south-western Victoria west from the Casterton to Portland areas to south-eastern South Australia and disjunctly on the Eyre Peninsula (Fig. 12). The single collection seen from the Eyre Peninsula was made in 1927 and requires confirmation. The taxon is found in heath and open woodland on sandy or rocky soils. Flowering July-November; fruiting October-November.

Conservation Status: The subspecies is found in a number of reserves in Victoria and South Australia. The disjunct population on the Eyre Peninsula (if still extant) is of conservation significance and requires investigation. A conservation code of 3RC- is appropriate.

Etymology: The subspecific epithet is derived from the Latin, *torquatus* (adorned with a collar), alluding to the collar of white simple hairs that arise from the style under the globular stigma that is reminiscent, on many specimens, of an Elizabethan ruff.

27d. *Boronia pilosa* subsp. ***parvidaemonis*** Duretto, *subsp. nov.*

A varietate typica ramis hispidulis, foliis glabratis vel glabris, sepalis minoribus deltatis glabris, stylo per stigmam magnam celato differt; a *Boronia pilosa* subsp. *torquata* Duretto foliis brevioribus differt.

Type: VICTORIA: LOWAN MALLEE: Little Desert NP, eastern block, 100 m SE of parking area at Salt Lake, 36°32'S 141°48'E, *N.G. Walsh 5377 and I. Thompson*, 7.viii.2001 (holotype MEL *2104896*; isotypes AD, CANB, HO, MEL *2104902*). (Figs 10 Q-S).

Boronia pilosa subsp. 2: M.F. Duretto, *Fl. Victoria* 4: 162 (1999), p.p.; J.H. Ross, *A Census of the Vascular Plants of Victoria, 6th edn*, 110, 138 (2000), p.p.

["*Boronia clavellifolia*" *auct. non* F.Muell.: F. Mueller, *Nat. pl. Victoria* 70 (1879); F. Mueller, *Key Vict. pl.* 2: 9 (1885); F. Mueller, *Key Vict. pl.* 1: 145 (1887-1888)]

["*Boronia inornata*" *auct. non* Turcz.: A.J. Ewart, *Fl. Victoria* 699 (1931); J.H. Willis, *A Handbook to Plants of Victoria, Dicotyledons* 2: 328 (1973); S.J.Forbes, P.K. Gullan, R.A. Kilgour and M.A. Powell, *A Census of the Vascular Plants of Victoria*, 96 (1984); S.J. Forbes and J.H. Ross, *A Census of Vascular plants of Victoria, 2nd edn*, 83 & 103 (1988); P.K. Gullan, D.C. Cheal and N.G. Walsh, *Rare and threatened plants in Victoria*, 8 & 30 (1990); J.H. Ross, *A Census of the Vascular Plants of Victoria, 3rd edn,* 86 (1990); J.H. Ross, *A Census of the Vascular Plants of Victoria, 4th edn,* 98 & 120 (1993); J.H. Ross, *A Census of the Vascular Plants of Victoria, 5th edn,* 105 & 129 (1996)]

Erect *shrub* to 50 cm tall. *Branchlets* hispidulous to pilose, hairs confined to area above leaf bases, hairs to 0.25(–0.4) mm long, leaf decurrencies absent. *Leaves* 3–7(–9)-foliolate, entire leaf in outline 4–10 mm long, 6–18 mm wide; petiole 0.5–1 mm long, minutely ciliate; rachis segments 1–2 mm long, hispidulous to ciliate to glabrous, proximal segments usually hairier than distal ones; terminal leaflets 1.5–4 mm long, 0.75–1 mm wide, flat to semiterete, palisade mesophyll almost or totally encircling leaflet, linear to narrowly obovate, glabrous, glabrescent or rarely sparsely hispidulous; lateral leaflets 2–7 mm long, 0.75–1.25 mm wide. *Inflorescence* axillary and terminal, 3–7-flowered, longer than leaves; peduncles 1–2 mm long, sparsely hispidulous between decurrent bract bases; prophylls 0.5–1 mm long, glabrous or ciliate; anthopodia 1–4 mm

long, glabrous or sparsely hispidulous between decurrent sepal bases. *Sepals* deltate, 1–2 mm long, 0.75–1 mm wide, glabrous to minutely ciliate. *Petals* 3.5–4 mm long, abaxial surface glabrous, ciliate. Filament margins and distal ends pilose. *Ovary* glabrous; style pilose; stigma significantly larger than style, together to 0.5 mm long. *Cocci* (mature not seen) c. 2 mm long, c. 1 mm wide, glabrous. *Seed* (mature not seen).

Additional specimens examined: **VICTORIA**: LOWAN MALLEE: By main N-S track through Little Desert NP, 23 km S of Kiata, 36°34'S 141°47'E, *T.B. Muir 6310*, 4.xi.1978 (MEL); Little Desert, *B.J. Conn s.n.,* 13.x.1973 (MEL *626023*); Little Desert, Salt Lake in Croynallan Parish, S of Kiata, *K.V. Hately s.n.*, 5.x.1954 (MEL *2100478*); Little Desert, beyond Salt Lake from Kiata, *M.E. Phillips 90*, 17.x.1963 (CANB); Little Desert, 14 miles [c. 22.4 km] S of Kiata, *A.C. Beauglehole 7026,* 5.ix.1962 (MEL); Eastern Little Desert NP reference area, *A.C. Beauglehole 83808,* 6.ix.1986 (MEL); Little Desert, *J. Bruhl s.n.*, 25.viii.1975 (CANB *412247*).

Notes: *Boronia pilosa* subsp. *parvidaemonis* differs from the subsp. *pilosa* by the hispidulous stems (hispidulous to pilose), glabrescent or glabrous [or rarely hispidulous] leaves (cf. glabrous to pilose, never hispidulous), smaller sepals (0.5–1 mm long; cf. 1–3.5 mm long), that are deltate (cf. narrowly deltate, rarely deltate in Tas.) and glabrous (cf. glabrous to pilose), and the style being obscured by the large stigma (cf. usually clearly seen); and from subsp. *torquata* by the smaller leaves (< 10 mm long; cf. > 10 mm long). It was on material of this subspecies that the occurrence of *B. clavellifolia* F.Muell. (= *B. inornata* var. *leptophylla* (Turcz.) Burgman) and *B. inornata* in Victoria was probably based (e.g. Mueller 1879, 1885, 1887-1888; FNCV 1923, 1928; Ewart 1931; Churchill & de Corona 1972; Willis 1973; Beauglehole 1980; Burgman 1985; Forbes *et al.* 1984; Forbes & Ross 1988b; Gullan *et al.* 1990; Ross 1990, 1993, 1996). *Boronia pilosa* can easily be distinguished from *B. inornata* by the eglandular stems (cf. distinctly glandular tuberculate stems), axillary and terminal inflorescences (cf. terminal), glabrous or ciliate or pilose sepals (cf. ciliate) and pilose staminal filaments (cf. glabrous).

Distribution and ecology: The subspecies is confined to the Little Desert National Park, western Victoria (Fig. 12), where it has been collected in mallee and heath on white sand. Flowering September-November; fruiting material has been collected in November.

Conservation Status: *Boronia pilosa* subsp. *parvidaemonis* is poorly collected though probably secure within a large National Park. The subspecies was considered uncommon by Ewart (1931), and vulnerable by Gullan *et al.* (1990), though they called it *B. inornata*, and a conservation code of 2VC-t is appropriate. Approximately 300 plants were seen when the type material was collected (Walsh, MEL, pers. com. 2001). Surveys are required to determine the size and extent of the known population and to determine if there are additional populations.

Etymology: The subspecific epithet is derived from the Latin, *parvus* (little) and *daemonis* (devils), and is named for my two sons, Oscar and Zachary, who, like *B. pilosa*, have given me great joy and angst over the last few years and, no doubt, like *B. pilosa*, will provide more in the future.

28. *Boronia rozefeldsii* Duretto, *sp. nov.*

A *B. pilosa* Labill. petalis longioribus et foliolis latioribus differt.

Type: TASMANIA: EAST COAST: Top of ridge, north east corner of Schouten Is., 42°19'S 148°18'E, *A.C. Rozefelds 1949*, 15.xi.2000 (holotype HO *509854*; isotype MEL *2091694*). (Figs 13 A-B).

Erect, woody *shrub* to 50 cm tall. *Branchlets* not obviously glandular, without or with faint leaf decurrencies, pilose to hispidulous, hairs evenly spread, to 0.25 mm long. *Leaves* imparipinnate, 3–7-foliolate, congested, not obviously glandular, entire leaf in outline 10–20 mm long, 22–26 mm wide; petiole 1–3 mm long, hispidulous; rachis segments 2–3 mm long, hispidulous to glabrescent with distal segments with fewer hairs; terminal leaflets 7–8.5 mm long, 2.5–4 mm wide, narrowly obovate to narrowly elliptic,

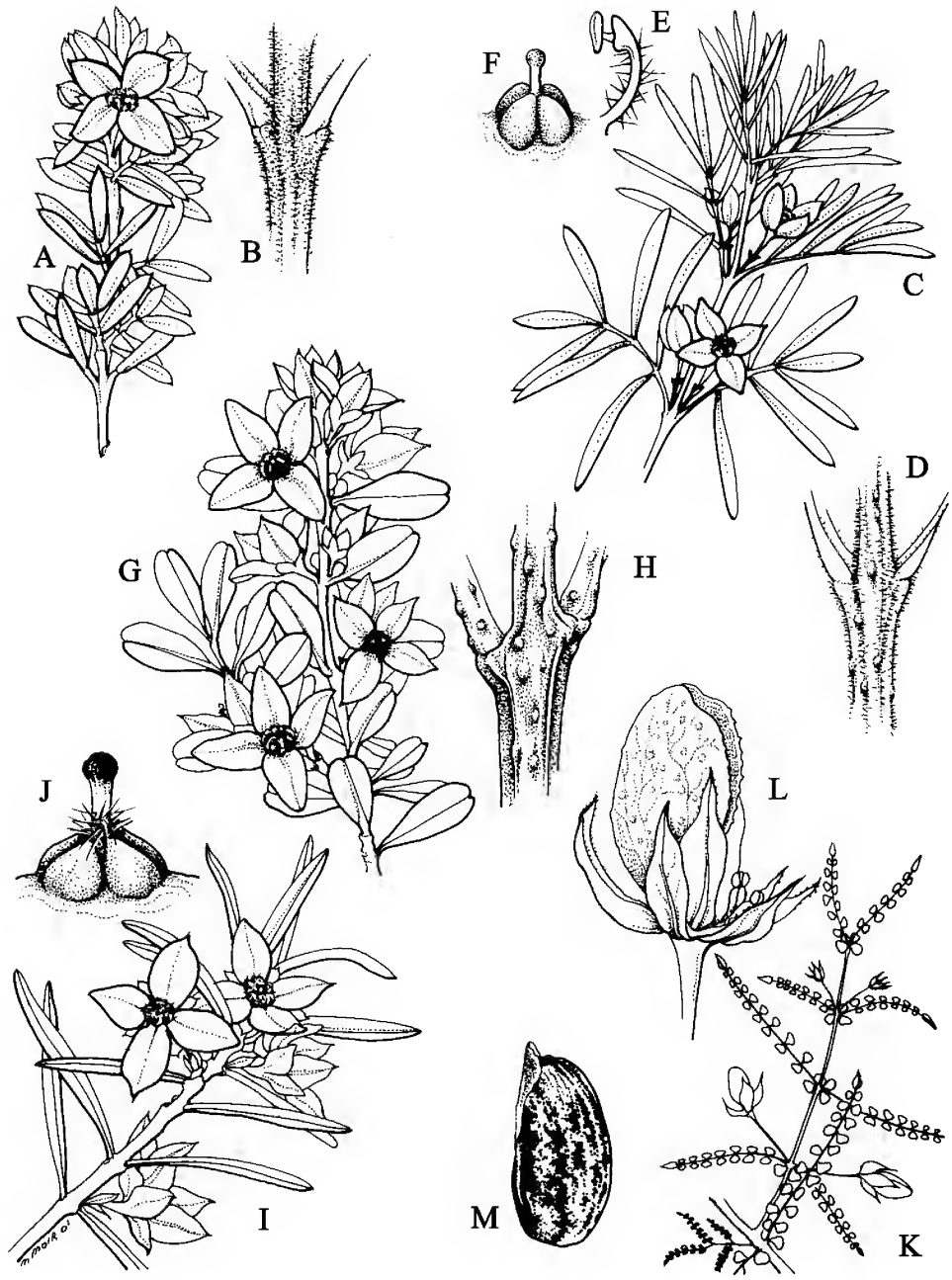

Figure 13. A-B, *B. rozefeldsii*: A, flowering branchlet, × 1; B, stem, × 5 (A-B, *Rozefelds 1949*, HO *509854*). C-F, *B. gunnii*: C, flowering branchlet, × 1; D, stem, × 5; E, antisepalous stamen, × 10; F, gynoecium, × 10 (C-F, *King s.n.*, HO *4711*). G-H, *B. grimshawii*: G, flowering branchlet, × 1; H, stem, × 5 (G-H, *Duretto 1316*, MEL *2059447*). I-J, *B. beeronensis*: I, flowering branchlet, × 1; J, gynoecium, × 10 (I-J, *Duretto 1330*, MEL *2059467*). K-M, *B. gravicocca*: K, flowering branchlet, × 1; L, flower in fruit, × 5; M, seed, × 5 (K-M, *Mitchell and J. Russell-Smith 2182*, MEL *286810*).

flat, discolorous, abaxial surface slightly paler, isobilateral, spongy mesophyll dense, glabrous or glabrescent, minutely serrate towards apex, apex acute to obtuse, minutely mucronate; lateral leaflets similar to terminal leaflets but longer, 7–12 mm long, 2–4 mm wide, more proximal leaflets slightly hispidulous at base, otherwise glabrous or glabrescent. *Inflorescence* axillary, 3–7-flowered, slightly longer than leaves; peduncles 1–2 mm long, hispidulous; prophylls and metaxyphylls 1–3.5 mm long, glabrous or ciliate, persistent; anthopodia 3–6 mm long, hispidulous between decurrent sepal bases. *Sepals* deltate, c. 2 mm long, c. 1.5 mm wide, not obviously glandular, ciliate, sometimes sparsely. *Petals* pink, 8–10 mm long, adaxial surface minutely pilose, abaxial surface pubescent along margins, tip with prominent subterminal apiculum. *Staminal filaments* glandular tuberculate towards apex, margins and distal ends pilose but not densely so; anthers glabrous, not apiculate. *Ovary* glabrous, style glabrous or with few hairs; stigma entire, slightly wider than style, together c. 0.75 mm long. *Cocci* c. 4 mm long, c. 2 mm wide, glabrous or with few hairs along suture. Seed not seen.

Additional specimens examined: TASMANIA: EAST COAST: Top of ridge, north east corner of Schouten Is., 42°19'S 148°18'E, *A.C. Rozefelds 1983*, 15.xi.2000 (HO); Bear Hill, Schouten Is., 42°19'S 148°17'E, *M.F. Duretto 1469, A.C. Rozefelds and A. Griffin,* 26.ii.2002 (HO, MEL).

Notes: *Boronia rozefeldsii* differs from *B. pilosa* by the large petals (8–10 mm long; cf. 3–6.5(–8) mm long), glabrous or ciliate sepals (cf. pilose to glabrous) and wider leaflets (2–4 mm wide; cf. 0.5–2(–4) mm wide). The large petals also distinguish it from all other Tasmanian Boronias. Specimens of *B. pilosa* at Mt Amos and Mt Graham (Tas. - Freycinet Pen.) approach *B. rozefeldsii* in appearance (see discussion under *B. pilosa* subsp. *pilosa*). The typical form of *B. pilosa* subsp. *pilosa* (with small and narrow leaflets) is also found on Schouten Island but locally the two are easily distinguishable and do not intergrade: *B. pilosa* subsp. *pilosa*, at these localities, has pilose stems and often pilose leaves, and smaller petals. *Boronia rozefeldsii* is also similar to *B. citriodora* as both have wide, flat leaflets and after collection the petals dry orange. In *B. pilosa* the petals usually dry pink.

This taxon, like *B. beeronensis* and *B. grimshawii* which are also described here (see below), was only recently collected for the first time, and from not so remote areas. All three taxa are spectacular with rather large flowers. It is notable that such showy taxa are still being discovered from areas that are only day trips from major capital cities.

Distribution and ecology: *Boronia rozefeldsii* is confined to Schouten Island, Tasmania (Fig. 11). Plants can be found growing in sparsely vegetated areas in shallow crevices on bare granitic outcrops and ridgelines (Rozefelds, HO, pers. comm. 2001; pers. obs.). Flowering material has been collected in November and fruiting material in February.

Conservation status: *Boronia rozefeldsii* is known from three small populations on Schouten Island. The populations are confined to rocky outcrops. All populations seen consist of few individuals (up to 12; pers obs.; Rozefelds, HO, pers comm.) and are extremely localised. Schouten Island is found within Freycinet National Park. Informal tracks to the top of Bear Hill bisect one of the known populations and the use of these tracks, and associated vegetation damage and erosion, is a real threat to that population. Elsewhere the taxon is probably secure though in reality in precarious positions. Any increase in the number of visitors, and how far they range, would pose a major threat to *B. rozefeldsii* as would any developments on the island. A conservation code of 2ECit is appropriate. Surveys are urgently required to ascertain the size and number of populations on the island.

Etymology: *Boronia rozefeldsii* is named for Andrew Rozefelds (HO) who was the first to collect this species and recognise it as an undescribed species.

29. *Boronia gunnii* Hook.f., *Flora Tasman.* 1: 68, t. 10 (1855); *B. pinnata* var. *gunnii* (Hook.f.) Benth., *Fl. Austral.* 1: 319 (1863), *nom. illeg.*, epithet var. *grandiflora* available. *Type citation*: "Mr. Gunn (n. 8)." *Type*: South Esk [Tasmania], *Gunn 8* (lectotype K, here designated, *n.v.* [ex Hooker's herbarium, 4 sprigs, identified 17.xii.1844, with rough drawings, cibachrome MEL *2041276,* photograph AD *99548091*]; isolectotypes K *n.v.* [ex Hooker's herbarium, mixed collection with material collected by Lawrence, identified 14.x.1843; cibachrome MEL *2041278*], K *n.v.* [ex Hooker's herbarium, 6 sprigs; cibachrome MEL *2041277*], NSW [x2]).

Boronia tetrandra var. *grandiflora* Hook., *J. Bot. (Hooker)* 2: 419 (1840). *Type citation*: "Launceston. Mr. Gunn (n. 8)." *Type*: South Esk [Tasmania], *Gunn 8* (lectotype K, here designated, *n.v.* [ex Hooker's herbarium, 4 sprigs, identified 17.xii.1844, with rough drawings, cibachrome MEL *2041276*, photograph AD *99548091*]; isolectotypes K *n.v.* [ex Hooker's herbarium, mixed collection with material collected by Lawrence, identified 14.x.1843; cibachrome MEL *2041278*], K n.v. [ex Hooker's herbarium, 6 sprigs; cibachrome MEL *2041277*], NSW [x2]).

[*Boronia variabilis* Hook. var. α Hook., *J. Bot. (Hooker)* 1: 255 (1834), *nom. inval.* Specimens cited: "Mr. Lawrence, (1831.), Mr. Gunn, (n. 8.)".]

["*Boronia pilosa*" *auct. non* Labill.: W.M. Curtis and W.M. Morris, *Student's Flora of Tasmania* 1, 104 (1975), p.p.]

Erect, woody *shrub* to 120 cm tall. *Branchlets* slightly glandular tuberculate and glands often shiny, hispidulous, hairs concentrated between faint leaf decurrencies, hairs to 0.1 mm long. *Leaves* imparipinnate, 5–9-foliolate, entire leaf in outline 12–32 mm long, 16–50 mm wide, slightly glandular tuberculate, glands usually shiny; petiole 3–6 mm long, adaxial surface hispidulous, abaxial surface glabrescent to hispidulous; rachis segments 1–5 mm long, adaxial surface hispidulous to glabrous, distal segments with fewer hairs, abaxial surface glabrous or glabrescent; terminal leaflets 5–16 mm long, 0.75–2.5 mm wide, narrowly oblanceolate, discolorous, abaxial surface slightly paler, glabrescent, flat, margins faintly and minutely serrate towards apex, tip obtuse to acute; lateral leaflets similar to terminal leaflets but longer, 5–25 mm long, 0.75–2.5 mm wide, more proximal leaflets sparsely hispidulous at base, otherwise glabrous or glabrescent. *Inflorescence* axillary, 1–7-flowered, very sparsely hispidulous, shorter than leaves; peduncles 1.5–3 mm long, secondary inflorescence units 1–3.5 mm long; prophylls 1–2 mm long, glabrous or glabrescent; metaxyphylls c. 0.5 mm long, glabrous; anthopodia 5–9 mm long. *Sepals* deltate, c. 1 mm long, 0.75–1 mm wide, not obviously glandular, glabrous or minutely ciliate or slightly hispidulous towards apex, tip with slight subterminal apiculum. *Petals* pink, 5–8 mm long, glabrous or minutely ciliate or sparsely puberulous along margins, tip with subterminal apiculum. *Staminal filaments* glandular tuberculate towards apex, margins and distal ends sparsely pilose; anthers not apiculate. *Ovary* glabrous; style glabrous (Launceston area) or with few hairs (Aspley R. area); stigma entire, minute, slightly wider than style; stigma and style together 0.5–1 mm long. *Cocci* (mature not seen) glabrous. *Seed* not seen. **Gunn's Boronia**, **Cataract Gorge Boronia.** (Figs 13 C-F).

Additional specimens examined: **TASMANIA**: MIDLANDS: South Esk River near Launceston, *Gunn s.n.*, 20.x.???? (MEL *305711*, seen by Bentham); Cataract Gorge, Launceston, 41°27'S 147°07'E, *C. Stuart 1*, 20.x.1843 (HO); *ibid*, ix.1921, *H.M.R.. Rupp s.n.* (MEL *2100517*); Cataract of South Esk at Launceston, *Samstannafords [S.G. Hannaford ?] s.n.* (MEL *305717*); Rocks on the South Esk, Launceston, *S.G. Hannaford s.n.*, x.1863 (MEL *305718*); South Esk near Launceston, 29.x.1961, *H.J.King s.n.* (MEL *2100515*); 2nd Basin, Cataract Gorge, Launceston, 41°27'S 147°09'E, *T.Carr s.n.*, 1.x.1897 (HO *508222*); Tasmania, *C. Stuart s.n.* (MEL *110986*); *ibid*, *S.G. Hannaford s.n.*, 15.xi.1863 (HO *4706*); *ibid*, *T.E. Burns 451,* 25.x.1961 (HO); *ibid*, *H.J. King s.n.,* 24.x.1959 (HO *4711*); Launceston, 41°27'S 147°07'E, *A.M. Olsen s.n.*, 14.i.1937 (HO *45668*); Reedy Basin, 41°29'S 147°04'E, *W.V. Fitzgerald s.n.*, x.1894 (HO *4571*); EAST COAST: Aspley River, 41°53'S 148°10'E, *P. Collier 946*, 2.xi.1985 (HO); Denison Riverlet, 41°50'S 148°15'E, *R. Burns (ANBG 1411)*, 11.vi.1987 (CANB); CENTRAL HIGHLANDS: Cradle Mountain, 41°40'S 145°57'E, *M. Olsen s.n.*, i.1937 (HO *4705* [locality doubtful, see below]).

Notes: W.J. Hooker (1834) had a broad concept of *B. variabilis* (= *B. anemonifolia* subsp. *variabilis*, see Neish & Duretto 2000) in which he included the type of *B. gunnii*. Later (1836) he transferred this type material to *B. tetrandra* which included the many forms of *B. pilosa* and *B. citriodora*. J.D. Hooker (1840) then described *B. tetrandra* var. *grandiflora* (see synonymies). Mueller (1860-1862) placed *B. gunnii*, with *B. citriodora*, in synonymy under *B. pinnata*. Bentham (1863) reduced *B. gunnii* to varietal rank under *B. pinnata* and he included *B. citriodora* in his concept of this taxon. Rodway (1903) reduced both *B. gunnii* and *B. citriodora* to varietal status under *B. pinnata*. Cheel (1929) considered *B. gunnii* to be a distinct species though he appeared to have included *B. pilosa* subsp. *torquata* from western Victoria in his concept. This may have been followed by Curtis (1956) as she recognised *B. gunnii* and listed Victoria as part of its distributional range. King and Burns (1969) and Galbraith (1977) recognised *B. gunnii* and called it the Cataract Gorge Boronia and Gunn's Boronia respectively. Curtis and Morris (1975) included *B. gunnii* in a broad concept of *B. pilosa* and noted that the larger leaved plants from near Launceston (here recognised as *B. gunnii*) warranted further investigation. The classification of Curtis and Morris was followed by Buchanan *et al.* (1989) and Buchanan (1995) in their censuses of the Tasmanian Flora. Weston *et al.* (1984) recognised *B. gunnii* and included it in their *B. pilosa* group.

Boronia gunnii differs from other Tasmanian species by the long narrowly obovate leaves, hispidulous stems with minute hairs (to 0.1mm long), slightly glandular tuberculate stems, the shiny glandular areas that dot the leaves and stems, and the small sepals. The collections from eastern Tasmania have longer (to 25 mm long) and narrower (0.75–1.5 mm wide) leaflets than plants collected from near Launceston. The styles of the Aspley River specimen (*P. Collier 946*) are sparsely pilose while those of plants from the Launceston area are glabrous [*R. Burns (ANBG 1411)* is sterile].

Cheel (1929, p. 300) noted that *B. gunnii* has a distinct sage scent. Horticultural notes for *B. gunnii* are given by Elliot and Jones (1982).

Distribution and ecology: *Boronia gunnii* has been collected from near Launceston (N Tasmania), mainly from Cataract Gorge where it was thought to be confined (e.g. King & Burns 1969). Recently it was collected from the Aspley River and Dennison River areas (E Tasmania) (Fig. 11). The collection from Cradle Mountain (*Olsen s.n.*, HO *4705*) requires confirmation but is presumed here to be erroneously labeled. Very little in the way of habitat information is available from collections except that the species is usually found near rivers (*Burns ANBG 1411*, *Collier 946*), and sometimes sheltered by rocks (*Collier 946*). *Boronia gunnii* was found to be self incompatible by Weston *et al.* (1984), though they may have been working with material of *B. pilosa*. Flowering October-January. Immature fruiting material has been collected in January.

Conservation status: A conservation code of 3VC- is appropriate for the species as it is known from few areas and from few collections. The species may be threatened in the Launceston area as the last collection made there, that has been seen by the author, was in 1961.

Etymology: The specific epithet is for Ronald Campbell Gunn who collected extensively in Tasmania in the 19th Century (see Buchanan 1990).

30. *Boronia falcifolia* A.Cunn. ex Endl., in Endl. *et al.*, *Enum. pl.* 16 (1837), written as *B. paleifolia* [an orthographic error, see below]. *Type citation*: "Moreton Bay. (A. Cunningh. 1824)." *Type*: Moreton Bay [Moreton District, Queensland], *AC* [Alan Cunningham], 1824 (lectotype, here designated, W *n.v.* [photothek nr. *2013*, copy at MEL *2068461*]; Peel's Is., Moreton Bay, N.S. Wales [Moreton District, Queensland, c. 27°30'S 153°20'E], *A. Cunningham No. 34*, x.1824 (probable isolectotypes CGE *n.v.* [transparencies MEL *2041293*], K *n.v.* [ex Alan Cunningham's Australian Herbarium, cibachrome MEL *2041265*, photograph AD *99548079*], MEL *248924*, TCD).

Boronia falcifolia A.Cunn. ex Lindl., *Edwards's Bot. Reg.* 27, sub.t. 47 (1841), *nom. Illeg. non* A.Cunn. ex Endl. *Type citation*: "Moreton Bay." *Type*: Peel's Is., Moreton Bay, N.S. Wales [Moreton District, Queensland], *A. Cunningham No. 34*, x.1824 (lectotype, here designated, CGE, *n.v.* [transparencies MEL *2041293*]; isolectotype K *n.v.* [ex Alan Cunningham's Australian Herbarium, cibachrome MEL *2041265*, photograph AD *99548079*], MEL *248924*, TCD, W *n.v.* [photothek nr. 2013, copy at MEL *2068461*]).

Boronia falcifolia var. *alba* F.M.Bailey, *Compr. cat. of Queensl. pl.* 76 (1913), *nom. inval.,* no description or specimen cited, equated with *B. falcifolia* by Stanley and Ross, *Fl. South East Queensland* 1, 450 (1983).

Boronia falcifolia A.Cunn. ex Lindl. 'trifoliolate leaf' form: S.W.L. Jacobs and J. Pickard, *Plants of New South Wales. A census of the Cycads, Conifers and Angiosperms* 191 (1981).

Boronia falcifolia A.Cunn. ex Lindl. 'simple leaf' form: S.W.L. Jacobs and J. Pickard, *Plants of New South Wales. A census of the Cycads, Conifers and Angiosperms* 191 (1981).

Illustrations: B.A. Lebler, *Queensland Agric. J.* 98: 195 (1972); B.A. Lebler, *Wildflowers of South East Queensland* 1: 25 (1977); N.W. Beadle and L.D. Beadle, *Students Fl. North East New South Wales* 4: 554, Fig. 243a (1980); K.A.W. Williams, *Native Plants Queensland* 1: 33 (1980), photograph; T.D. Stanley and E.M. Ross, *Fl. South East Queensland* 1: 451, Fig. 69h (1983); P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 235 (1991); P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: opp. 198 [photograph], 276 (2002).

Erect or weak, woody *shrub* with few stems, to 1.5 m tall, will regrow from rootstock (Auld 2001), glabrous apart from flowers. *Branchlets* slightly angled to prominently four angled, not obviously glandular, leaf decurrencies absent. *Leaves* simple or imparipinnate; pinnate leaves 3(–5)-foliolate, entire leaf in outline 6–38 mm long, 5–40 mm wide; petiole 3–15 mm long; rachis segments 3–10 mm long; simple leaves and leaflets 3–25 mm long, 0.5–1.5 mm wide, linear to terete, usually falcate, concolorous, dorsiventral, palisade mesophyll almost encircling leaflet, margins entire, apex acuminate to slightly mucronate, terminal and lateral leaflets similar. *Inflorescence* in upper axils, 1–3-flowered, longer than leaves; peduncles 2–9 mm long; prophylls 3–4 mm long; metaxyphylls 2–3 mm long; anthopodia 4–7 mm long. *Sepals* narrowly deltate, 3.5–4 mm long, 1–1.5 mm wide, not obviously glandular, glabrous, margins incurved towards apex. *Petals* bright pink, 4–8 mm long, adaxial surface minutely pilose along margins and towards apex, becoming glabrous towards centre and base, abaxial surface minutely pilose along margins and towards apex, tip with subterminal apiculum. *Staminal filaments* glandular tuberculate towards apex, sometimes only slightly, sparsely pilose; anthers glabrous, not apiculate. *Ovary* glabrous; style sparsely to densely pilose; stigma entire, minute, not or scarcely wider than style. *Cocci* 2.5–4 mm long, 1.5–2 mm wide, glabrous. *Seed* black, 1.5–2 mm long, c. 1 mm wide. **Wallum Boronia.**

Representative specimens (c. 300 specimens examined): **QUEENSLAND**: WIDE BAY: Littabella NP about 40 km NW of Bundaberg, 24°38'S 152°03'E, *A.R. Bean 7009*, 18.ix.1993 (BRI *n.v.*, CANB); Burrum Coast NP, Woodgate section, 25°09'S 152°30'E, *P.I. Forster 19869 and G. Leiper*, 22.x.1996 (BRI, MEL, NSW); 1 km W of Poona Point, 25°43'S 152°54'E, *P.I. Forster 13921 and G. Smyrell*, 20.ix.1993 (BRI, CANB, MEL); Fraser Is., Lake Mackenzie near creek, 25°27'S 153°03'E, *D.A. Smith 64*, 18.viii.1971 (BRI, MEL); MORETON: 7.2 km W of Caloundra, 26°47'S 153°05'E, *J.H. Ross 3161*, 26.viii.1986 (BRI, CANB, HO, MEL, NSW); North Stradbroke Is. near Brown Lake, 27°3–'S 153°2–'E, *C. Bell 171*, 12.viii.1970 (BRI); **NEW SOUTH WALES**: NORTH COAST: c. 1 mile [c. 1.6 km] N of Evans Head, c. 29°05'S 153°25'E, *R.D. Hoogland 11653*, 8.x.1969 (CANB, NSW); 3.2 km S of Yamba, W side of road, 29°27'S 153°21'E, *M.F. Duretto* 665, *P.G. Neish and I. Thompson*, 24.x.1995 (HO, MEL, NSW); c. 2 km S of Angourie, 29°31'S 153°21'E, *I.R. Telford 8959 and G. Butler*, 20.i.1983 (AD, CANB); Red Rock, 3 km from Pacific Hwy, c. 29°59'S 153°13'E, *N. Ollerenshaw 80,* 31.viii.1976 (CANB); Cathie Sandplain, c. 4 miles [c. 5.6 km] S of Port Macquarie [c. 31°30'S 152°45'E], *R. Pullen 4370*, 4.ix.1970 (CANB, NSW); Crowdy Bay NP (c. 28 km north of Coopernook), 31°50'S 152°45'E, *J. Armstrong 1162*

and J.M. Powell, 29.ix.1977 (CANB, NSW); Myall Lakes, 32°32'S 152°12'E, *R. Bates 2212*, ix.1982 (AD); Shoal Bay, Port Stephens, 32°43'S 152°10'E, anon., ex Herb Rodway No. 12297 (NSW *369381*).

Nomenclature: Endlicher (1837) described this species as *B. paleifolia*, based on a specimen made by Cunningham with one of Cunningham's manuscript names written on the label. It would appear that Endlicher misread the label which reads as *B. falcifolia* as can be seen on both the material at K and W. The writing is difficult to read and it would be easy to misinterpret it as 'paleifolia'. Lindley (1841) described the same taxon as *B. falcifolia*, also using Cunningham's material and manuscript name. Endlicher's misspelling was noted by Bentham (1863) though he synonymised the earlier *B. paleifolia* under the later *B. falcifolia* A.Cunn. ex Lindl. stating "*B. paleifolia*, Endl. in Hueg. Enum. 16 (through a misreading of Cunningham's label)". Bentham solved one problem and created another. Bailey (1899) also noted the misspelling. The earlier name has priority and as it was Cunningham's intent to name the species *B. falcifolia* the correct course of action is to correct Endlicher's orthographic error (as done above).

Notes: Maiden and Betche (1904) recorded a collection of *B. inflexa* subsp. *montiazura* (see above) that were made by Boorman in 1904 near Stanthorpe as *B. falcifolia*. They considered that though the inland population was 'very different-looking' it could not be separated even as a variety. Both taxa do have narrow trifoliolate leaves but differ enough to be placed in different sections. Galbraith (1977) called *B. falcifolia* the Sickle Leaved Boronia.

Distribution and ecology: *Boronia falcifolia* is found growing in wallum, closed heathland and occasionally woodland on wet sand and seasonally flooded areas, in coastal areas from Littabella National Park, c. 40 km north-west of Bundaberg (Qld) to just north of Myall Lakes National Park near Bulahdelah (NSW) (Fig. 12). Flowering mainly August-October; fruiting mainly October-November; isolated flowering and fruiting occurs throughout the year.

Conservation status: The species appears to be common, widespread, found in a number of reserves, and under no immediate threat except localised extinction.

Etymology: The specific epithet is derived from the Latin, *falcatus* (sickle-shaped) and *folia* (leaf), referring to the slightly curved and narrow leaflets.

31. *Boronia filifolia* F.Muell., *Fragm.* 1: 3 (1858). *Type citation*: "In planitiebus arenosis ad sinum Encounter Bay." *Type*: Sandy plains, near Encounter Bay, South Australia, *F. Mueller s.n.*, x.1847–i.1849 (lectotype, here designated, MEL *243039*).

Illustrations: J.M. Black, *Fl. S. Austral.* 2, Fig. 154 c (1924), stamen; J.M. Black, *Fl. S. Austral.* 2nd edn: 2, Fig. 664 c (1948), stamen; A. Ashby, illustrated in M. Beek, *Australian Plants* 5: 300 (1970); B. Conabee and J. Garnet, *Wildflowers of South East Australia* 1: pl. 2 (1974); W.R. Elliot and D.L. Jones, *Encyclopedia of Australian Plants* 2nd edn: 341 (1985); J.A. Armstrong and I.R. Telford, *Fl. S. Australia part 2*: p. 770, Figs 412a-c (1986), fruit and seed; G.R.M. Dashorst and J.P. Jessop, *Plants of the Adelaide Plains and Hills*, 96, pt 41, 3-3a (1990); M.F. Duretto, *Fl. Victoria* 4: 163, Fig. 29a (1999); M.G. Corrick and B.A. Fuhrer, *Wildflowers of Victoria* 206 (2000), photograph.
Erect or weak, woody *shrub* to 1 m high, glabrous apart from flowers. *Branchlets* not obviously glandular, leaf decurrencies absent or faint. *Leaves* simple or imparipinnate, not obviously glandular; pinnate leaves 3(–7)-foliolate, entire leaf in outline 6–23 mm long, 12–30 mm wide, petiole 2–8 mm long, rachis segments 1–7 mm long, leaflets similar to simple leaves, c. equal, 3–20 mm long, 0.5–1.5 mm wide; simple leaves with petiole to 0.5 mm, lamina 3–30 mm long, 1–1.5 mm wide, linear to narrow-obovate, slightly discolorous, abaxial surface paler, flat to terete, palisade mesophyll encircling leaflets, margins entire, not or slightly channeled above, apex acute. *Inflorescence* terminal on short branches and axillary in upper nodes of branches, 1–5-flowered, longer than leaves;

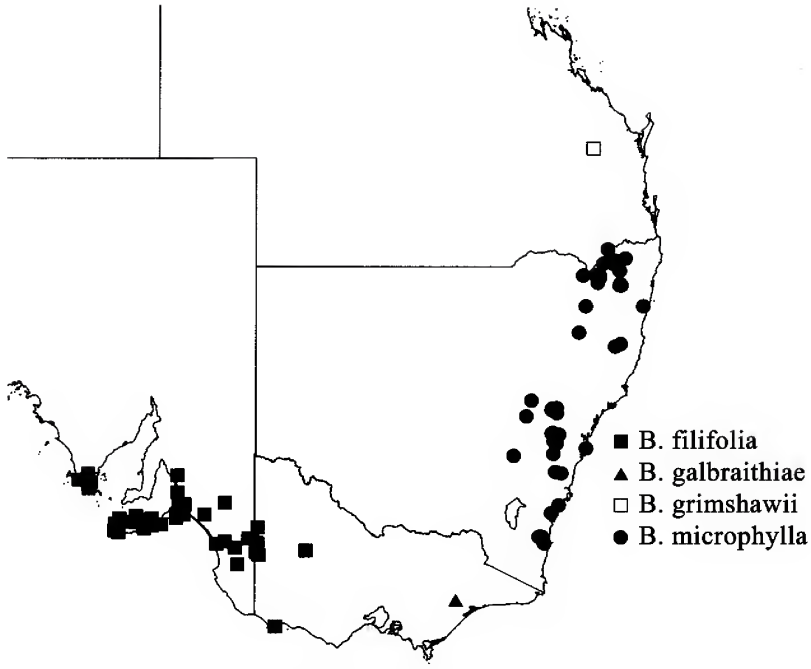

Figure 14. Distribution of *B. filifolia* (solid squares), *B. galbraithiae* (solid triangle), *B. grimshawii* (open square), *B. microphylla* (solid circles).

peduncles 8–17 mm long; prophylls and metaxyphylls 0.5–2 mm long; anthopodia 2–13 mm long. *Sepals* narrowly deltate to ovate-deltate, 1–3 mm long, 0.5–1.5 mm wide, not obviously glandular, glabrous. *Petals* pale to deep pink, 3.5–12 mm long, adaxial surface sparsely puberulous, abaxial surface with a moderate indumentum of small simple hairs (c. 0.1 mm long) that are appressed and pointing proximally and either side of the midrib, tip with slight subterminal apiculum. *Staminal filaments* glandular for most of length, sparsely pilose or rarely glabrous; anthers glabrous, apiculum absent or minute. *Ovary* glabrous; style pilose or rarely glabrous; stigma entire, minute, barely wider than style. *Cocci* 3–4 mm long, 1.5–2 mm wide, glabrous. *Seed* black, 2–3 mm long, 1–1.5 mm wide. n=9 (Stace and Armstrong 1992; Stace *et al.* 1993). **Slender Boronia**.

Representative specimens (c. 200 specimens examined): **SOUTH AUSTRALIA**: EYRE PENINSULA: Wanilla Wildlife Reserve, c. 30 km NNW of Port Lincoln, *J.B. Cleland s.n.*, 12.viii.1964 (AD *96725135*); Hundred of Wanilla, c. 25 km NNW of Port Lincoln, [34°44'S 135°52'E], *C.R. Alcock 86*, 20.xii.1964 (AD, MEL); Sleaford Bay 1 mile [1.6 km] from shore [34° 54'S 135°47'E], *A. Adcock s.n.*, 8.vii.1935 (AD *97936176*); SOUTHERN LOFTY: 0.6 km along dirt track travelling E from Signal Rd; track 8.6 km N of Signal Rd junction with Strathalbyn-Goolwa Rd, 35°19'S 138°47'E, *M.F. Duretto 1250*, 27.ix.1997 (AD, CANB, MEL); Road Junction on road to Cape Jervis from Victor Harbour on N side of Newland Hill, 34°34'S 138°34'E, *D.J.E. Whibley 8960*, 23.xi.1983 (AD); Hundred of Kondoparinga, Meyer's Scrub near Ashbourne, *P.B. Copley 269*, 9.viii.1978 (AD); KANGAROO ISLAND: 9.2 km NE of bridge over Harriet R. at Vivonne Bay on South Coast Rd, 50 m SW from road intersection, 35°36'S 137°15'E, *F.E. Davies 1505 and B. Hadlow*, 2.xii.1989 (AD, CANB, MEL, PERTH); Flinders Chase NP, banks of Rocky River, where the river crosses Shackle Rd, c. 2 km N of the Rocky River Homestead, *J.R. Wheeler 1233*, 18.x.1968 (AD, MEL); SOUTH EASTERN: 38 km S of Keith, 36°26'S 140°23'E, *L.D. Williams 7064*, 22.ix.1975 (AD); Gum Lagoon Conservation Park, northern edge, 36°15'S 140°02'E, *P.J. Lang 1685*, 8.x.1984 (AD, CANB, MEL); Fairview Reserve, 36°49'S 140°25'E, *G. Gardiner s.n.*, 1977 (AD *97751082*); c. 16 km N of Bordertown, *A.C. Beauglehole 7095 and D.N.*

Kraehenbuehl, 6.xi.1964 (AD, MEL); **VICTORIA**: LOWAN MALLEE: Big Desert, 18 miles [c. 28.8 km] N of Kaniva, *M.E. Phillips*, 22.10.1966 (AD); Southern fringe of the Great Desert, c. 8 miles [c. 12.8 km] N of Servicetown, *J.H. Willis* s.n., 16.ix.1948 (MEL *516315*); Telopea Downs, N side of McCrackens Rd, 36°11'E 141°00'E, *J.G. Eichler 83*, 7.viii.1998 (MEL); S.A. Border, beside border track. 8.5 km SSW of Red Bluff, *N.G. Walsh 1469*, 24.ix.1985 (MEL).

Notes: The description presented here is based largely on South Australian material. *Boronia filifolia* can be easily distinguished from all other Boronias on the East Coast by being glabrous and by the filiform leaves or leaflets. A double flowered form is found on Kangaroo Island (pers. obs.). Guilfoyle (1911) called this species the Thread-leaved Boronia, a name not widely used today. The species is apparently an attractive horticultural subject and horticultural notes are given by Elliot and Jones (1982).

Distribution and ecology: The species is found on Kangaroo Island, the Eyre and Fleurieu Peninsulas, south-eastern South Australia, and in the Little Desert National Park (Vic.) (Fig. 14). It is found in heath, mallee and woodland on limestone pavement, laterites, ironstones and sandy gravels. *Boronia filifolia* was found to be self incompatible by Weston *et al.* (1984). Flowering July-February; fruiting October-February.

Conservation status: Leigh *et al.* (1981) gave *B. filifolia* a conservation code of 3RC while Briggs and Leigh (1988, 1996) do not list it. In Victoria, the species is known to occur only near the South Australian Border in the Little Desert National Park and is considered to be very rare and vulnerable (Gullan *et al.* 1990; Ross 2000). On the South Australian mainland the species is fragmented in distribution and probably should be considered rare or vulnerable. The species is very common on Kangaroo Island (SA) and appears secure in several widespread reserves (pers. obs.).

Etymology: The name is derived from the Latin, *filum* (thread) and *folium* (leaf) and refers to the very narrow leaflets.

32. *Boronia deanei* Maiden & Betche, *Proc. Linn. Soc. New South Wales* 31: 731 (1907). *Type citation*: "Gregarious in swamps between Clarence and Wolgan, Blue Mountains (H. Dean; October, 1906)." *Type*: Near Clarence Siding, Blue Mountains, New South Wales, *H. Dean s.n.*, x.1906 (lectotype, here designated, NSW *282186*; isolectotypes K *n.v.* [photograph AD *99548126*], NSW *282153*); Newnes, New South Wales, *H. Dean s.n.*, 28.x.1906 (residual syntype NSW *122259*).

Illustrations: A. Fairley and P. Moore, *Native Plants of the Sydney District*, 236, pl. 822 (1989), photograph; P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 236 (1991).

Erect or weak, woody *shrub* to 1.5 m high, glabrous, though with a raised ring of minute tubercula around slightly raised glands on the leaves and branchlets. *Branchlets* slightly angular, slightly glandular tuberculate, leaf decurrencies present. *Leaves* simple, sessile; lamina 2–12 mm long, 0.5–1 mm wide, linear to linear-obovate to narrow-elliptic, ± terete, concolorous, dorsiventral, palisade mesophyll almost encircling entire leaf (subsp. *deanei*), margin entire but minutely serrate, thick, upper surface concave and smooth with sunken midvein, abaxial surface prominently glandular tuberculate, apex acute to obtuse. *Flowers* mostly solitary, terminal and axillary in upper axils; peduncles 1–3 mm long; prophylls 1-3 mm long, leaflike; anthopodia 1–3 mm long. *Sepals* deltate to narrowly deltate, 2–3 mm long, 1–1.5 mm wide, not obviously glandular, glabrous, acute or acuminate due to an infolding of the margins, tip with slight to prominent subterminal apiculum. *Petals* white to bright pink, 4–5 mm long, adaxial surface and tip of abaxial surface minutely pimpled, margins minutely serrate, tip with subterminal apiculum. *Staminal filament* glandular tuberculate towards apex; anthers glabrous, not apiculate. *Style* c. 0.5 mm long; stigma entire, minute, slightly wider than style. *Cocci* 2.5–3.5 mm long, 1–2 mm wide, glabrous. *Seed* (mature not seen) black or grey, 1.5–2.5 mm long, 1–1.5 mm wide. **Deane's Boronia.**

Notes: Maiden and Betche (1906) thought that *B. deanei* was closely related to *B. parviflora* probably because they both have small simple leaves. These species are

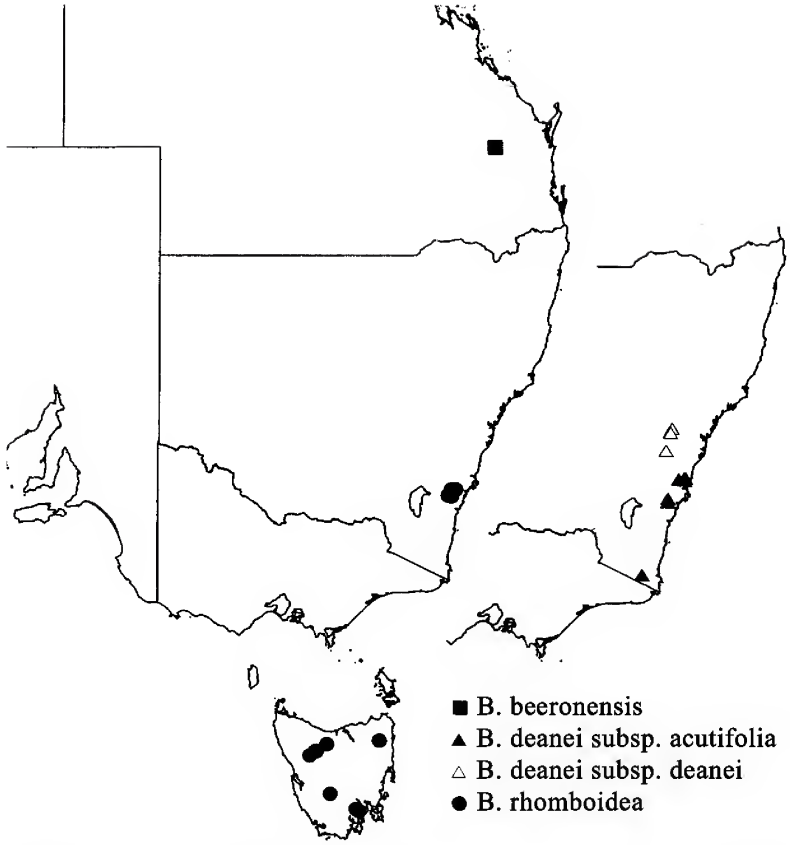

Figure 15. Distribution of *B. beeronensis* (solid square), *B. deanei* subsp. *acutifolia* (solid triangles), *B. deanei* subsp. *deanei* (open triangles), *B. rhomboidea* (solid circles).

classified into separate series within *B.* section *Boronia*. In New South Wales *B. deanei* is easily distinguished from other species by the simple, terete leaves and the small ring of minute tubercula surrounding the glands on the stems and leaves.

The species has apparently adapted well to cultivation and horticultural notes are given by Elliot and Jones (1982).

Distribution and ecology: *Boronia deanei* is found between Lithgow (Blue Mountains) and Nalbaugh National Park (NSW) (Fig. 15). It is usually found growing on sandstone in wet heath, though it has been collected from drier open forest. The known distribution, ecology and conservation status of this species in the Central Tablelands and Central Coast areas (NSW) are discussed by Benson and McDougall (2001). Flowering August-November; fruiting December.

Conservation status: The species has been considered to be rare (Hartley & Leigh 1979; Leigh *et al.* 1981; Briggs & Leigh 1988) or vulnerable (Keith & Ashby 1992; Leigh *et al.* 1993; Briggs & Leigh 1996; Walter & Gillett 1997; Benson & McDougall 2001) and urgent surveys are required to determine the extent and security of populations of the two subspecies (see below).

Key to subspecies of B. deanei

1. Leaves with obtuse apices; sepals c. 2 mm long .....**32a.** subsp. ***deanei***
1: Leaves with acute apices; sepals 2–3 mm long .....**32b.** subsp. ***acutifolia***

32a. *Boronia deanei* Maiden & Betche subsp. ***deanei***

Illustration: P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 276 (2002).

Branches sparsely glandular tuberculate. *Leaves* 2–12 mm long, 0.5–1 mm wide, linear to linear-obovate, straight, dorsiventral, palisade mesophyll almost encircling entire leaf, abaxial surface slightly glandular tuberculate, margin minutely serrated mostly near tip, apex obtuse. *Sepals* deltate to narrowly deltate, c. 2 mm long, c. 1 mm wide, acute.

Additional specimens examined: New South Wales: CENTRAL tablelands: Corner of Red Hill Rd and Glow Worm Tunnel Rd, Newnes SF, 33°19'S 150°15'E, G. D'Aubert 168 and P. Hind, 2.xii.1987 (CANB, NSW); Paddy's Ck Swamp, Newnes SF, 33°25'S 150°12'E, P.H. Benson 1333–4 and H. Bryant, 19.xi.1981 (NSW); 9.4 km from Zig Zag Railway turnoff, on road travelling away from Newes Forest Drive, 33°25'S 150°12'E, M.F. Duretto 691, P.G. Neish and I. Thompson, 28.x.1995 (MEL); Swamp at Happy Springs on Farmers Ck, c. 2 km above Lithgow Water Supply, 33°26'S 150°13'E, P.H. Benson 1341 and H. Bryant, 19.xi.1981 (CANB, NSW); Belarah Swamp, Whalania Heights, Kanangra-Boyd NP, 33°54'S 150°05'E, T.A. James 1513, P.G. Kodela and P. Hind, 23.ii.1995 (MEL, NSW); Clarence to Wolgan, J.H. Maiden s.n., xi.1906 (MEL 250907, NSW 282150); Walgeen Valley, J. Staer s.n., x.1910 (MEL 250908).

Distribution and ecology: This subspecies is restricted to the Blue Mountains (Fig. 15) where it found in swampy areas and woodland. Flowering September-December; fruiting November-December.

Conservation status: *Boronia deanei* subsp. *deanei* is rare and though found in Kanangra-Boyd National Park is not secure. When Maiden and Betche (1906) described *B. deanei* they noted that it was a gregarious species and that "there are acres of it, to the exclusion of almost any other plant." It would appear that the species has had a severe reduction in numbers in the 20th Century, and/or there are large unknown populations in existence in the swamps between Clarence and Wolgan, Blue Mountains. Many Boronias germinate in large numbers after fire (pers. obs.), and it could be that the ecology of the area has changed dramatically from when it was first collected. In addition, there may have been a fire a few years prior to the collection of the type material. Surveys are required to ascertain the extent of this subspecies. A conservation code of 2VC- or 2EC- is appropriate.

32b. *Boronia deanei* subsp. ***acutifolia*** Duretto, *subsp. nov.*

A varietate typica foliis acutis et sepalis longioribus differt.

Type: NEW SOUTH WALES: CENTRAL TABLELANDS: Budderoo Ck, c. 10 miles [c. 16.1 km] W of Kiama, 34°40'S 150°40'E, *E.F. Constable 6277*, 15.x.1965 (holotype MEL *1058128*; isotype NSW *90649 n.v.*).

Boronia sp. A: S.W.L. Jacobs and J. Pickard, *Plants of New South Wales. A census of the Cycads, Conifers and Angiosperms* 191 (1981).

Illustration: P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 276 (2002).

Branchlets moderately glandular tuberculate with glands dense along leaf decurrencies. *Leaves* 5–12 mm long, c. 1 mm wide, linear to narrow-elliptic, arched or straight, margin minutely serrate along entire length, abaxial surface prominently glandular tuberculate, apex acute. *Sepals* narrowly deltate, 2–3 mm long, 1–1.5 mm wide, appearing acuminate because of the incurved margins.

Additional specimens examined: **NEW SOUTH WALES**: CENTRAL TABLELANDS: Western side of Wingacarribe Reservoir near Fitzroy Falls, 34°37'S 150°42'E, *P. Cuneo 45 and R. Johnstone*, 3.xi.1988 (NSW); W side of Kangaroo River, 1.5 km upstream from Carrington Falls, Budderoo NP, 34°37'S 150°39'E, *J.D. Briggs 2354*, 6.ix.1988 (CANB, MEL, NSW); S of Carrington Falls, Lot 7, Cloonty Cloogler sub-division, along E bank of Kangaroo River, 34°37'S 150°39'E, *J.D. Briggs 2354*, 6.ix.1988 (CANB, MEL, NSW); CENTRAL COAST: Near top of Fitzroy Falls, 34°39'S 150°29'E, *I.R. Telford 3646*, 12.xi.1973 (CANB); Fitzroy Falls, 16 km SE

of Moss Vale, 34°39'S 150°29'E, *I.R. Telford 8506*, 26.viii.1980 (CANB); Fitzroy Falls, Moreton NP, 34°38'S 150°29'E, *R. Coveny 12176, W. Bishop and R. Makinson*, 19.ix.1985 (CANB); Fitzroy Falls, 7.4 miles [c. 12.5 km] SE of Moss Vale, 34°38'S 150°29'E, *E.M. Canning 6409 and B. Barnsley*, 25.xi.1986 (CANB, MEL, NSW); Fitzroy Falls, *A.G.H. s.n.*, 5.x.1913 (NSW *282136*); *ibid, A. Bronstey [?] s.n.*, ix.1911 (NSW *282112*); SOUTHERN TABLELANDS: Endrick River, c. 6 miles [c. 9.7 km] by road ESE of Nerriga, 35°09'S 150°10'E, *J.A. McGillivray 23*, 23.ix.1965 (MEL, NSW); Endrick River, at Nerriga-Vines track crossing, c. 10 km SE of Nerriga, 35°14'S 150°09'E, *D. Black s.n.*, iii.1983 (CANB *CBG8307389*); White Rock Plateau between Mt Wog Wog and White Rock, Nalbaugh NP, 37°05'S 149°25'E, *D.E. Albrecht 1638*, 26.v.1985 (CANB, MEL, NSW *n.v.*)

Notes: Weston (1990) equated *Boronia* sp. A (Jacobs & Pickard 1981) with the southern populations of *B. deanei*. He noted that though *Boronia* sp. A and *B. deanei* appear to intergrade the differences may warrant recognition.

Distribution and ecology: This subspecies is found in two disjunct areas centred on Fitzroy Falls and Nalbaugh National Park (Fig. 15) where it is found in wet heath on sandstone. Flowering September-November; fruiting material has been collected in November.

Conservation status: The subspecies is rare and protected in a number of reserves, e.g. Budderoo, Moreton and Nalbaugh National Parks: a conservation code of 3RC- is appropriate.

Etymology: The subspecific epithet is derived from the Latin, *acutus* (acute) and *folium* (leaf), and refers to the acute leaves which distinguishes this subspecies from the typical subspecies with obtuse leaf tips.

33. *Boronia microphylla* Sieber ex Rchb., *Iconogr. bot. exot.* 1: 53, t. 72 (1825). *Type citation*: "Sieb. Fl. Nov. Holl. exsicc. no. 302. ... in Nova Hollandia, cum praecedente crescens, eodem tempore florens." *Type*: Blue Mountains, New South Wales, Fl. Novae Holl. No. 302 Sieber (lectotype, here designated, K *n.v.* [cibachrome MEL *2041268*, photograph AD *99803341*]; isolectotypes MEL *258537*, MEL *258538*, TCD).

[*Boronia microphylla* Sieber ex Sprengel, *Syst. veg.* 4 (1827) *nom illeg., non* Sieber ex Rchb. *Type citation*: "Nov. Holl." *Type*: Blue Mountains, New South Wales, Fl. Novae Holl. No. 302 Sieber (lectotype, here designated, K *n.v.* [cibachrome MEL *2041268*, photograph AD *99803341*]; isolectotypes MEL *258537*, MEL *258538*, TCD)]

Illustrations: Reichenbach (*l.c.*); M. Baldwin, *Australian Plants* 8, 193 (1975), photograph; K.A.W. Williams, *Native Plants of Queensland* 1: 33 (1980), photograph; T.D. Stanley and E.M. Ross, *Fl. South East Queensland* 1: 451, Fig. 69j (1983), leaves and stem; A. Fairley and P. Moore, *Native Plants of the Sydney District*, 235, pl. 813 (1989), photograph; P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 235 (1991); B. McDonald, C. Gravatt, P. Grimshaw, and J. Williams, *Fl. of Girraween and Bald Rock*, 65 (1995), leaves and stem; P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 275 (2002).

Erect, woody *shrub* to 1 m tall, will regrow from rootstock. *Branchlets* glandular tuberculate, glands sometimes hemispherical in shape and usually with a crown of erect simple hairs or tubercula, glabrescent to hispidulous, hair density greater between leaf decurrencies, hairs to 0.2 mm long. *Leaves* imparipinnate, (3–)5–17-foliolate, entire leaf in outline (5–)7–30 mm long, 3–16 mm wide, glabrous to minutely and sparsely hispidulous with simple erect hairs mainly as crowns on glands, hair density greater on rachis; petiole 2–6 mm long, often glandular tuberculate; rachis segments 1.5–6 mm long, often glandular tuberculate abaxially; terminal leaflets 1–3(–7) mm long, 0.5–2.5 mm wide, elliptic to obovate to spatulate to broad spatulate, discolorous, abaxial surface slightly paler, dorsiventral, not or slightly glandular tuberculate; margins entire to slightly and minutely crenate, apex obtuse to truncate and sometimes mucronate or retuse to

obcordate; lateral leaflets similar to terminal leaflets but longer, 2–9.5 mm long, 1–3.5 mm wide. *Inflorescence* terminal and axillary, 1–5(–9)-flowered, sometimes glandular tuberculate, shorter to longer than leaves; peduncles 2–7 mm long, hispidulous; prophylls and metaxyphylls 1–2 mm long, glabrous, glabrescent or ciliate; anthopodia 2–6 mm long, hispidulous. *Sepals* deltate to narrowly deltate, 1–3 mm long, 1–2 mm wide, not obviously or slightly glandular, adaxial surface glabrous, abaxial surface glabrous or sparsely and minutely pilose at apex, ciliate. *Petals* pale to rosy pink, 4–9.5(–12, *Hosking 1856*) mm long, adaxial surface glabrous or sparsely and minutely pilose abaxial surface glabrous or sometimes pilose near margins, persistent or lately caducous, tip with slight subterminal apiculum. *Staminal filaments* densely pilose on margins and distal glands; anther loculi glabrous, anther with or without minute apiculum, apiculum sometimes with several stiff simple erect hairs. *Gynoecium* glabrous (most plants from NSW) or with tufts of simple hairs between ovaries and at base of style (most plants from Qld and Torrington, NSW); stigma entire, globular as wide or scarcely wider than style; stigma and style 0.5–0.75 mm long. *Cocci* 3–4 mm long, 2–2.5 mm wide, glabrous or sparsely pilose along margins. *Seed* dark brown to black, 2–2.5 mm long, 1–1.5 mm wide. n=11 (Smith-White 1954; Stace *et al.* 1993). **Small-leaved Boronia**.

Selected specimens (c. 300 specimens examined): **QUEENSLAND**: DARLING DOWNS: Cottonvale-Pozieres Rd, 0.5 km W of Cottonvale, 28°32'S 157°57'E, *K.A.W. Williams 75159*, 2.xi.1975 (BRI); Cottonvale, *A. Devereux s.n.*, 17.x.1961 (BRI *AQ151171*); Christie Target, 10 km due W of Wallangarra, 28°55'S 151°49'E, *A.R. Bean 1225*, 16.xii.1989 (BRI); Foot of Mt Norman, 7 km NE of Wallangara, 28°52'S 151°58'E, *I.R. Telford 3158*, 25.ix.1973 (CANB); **NEW SOUTH WALES**; NORTHERN TABLELANDS: Boonoo Boonoo State Forest 119, NE of Tenterfield, 28°56'S 152°08'E, *P.I. Forster 15809 and P. Machin*, 21.ix.1994 (AD, BRI, CANB *n.v.*, MEL, NSW *n.v.*); 20 km NW of Torrington, 15.2 km from the Gulf Rd (turn off Gulf Rd 25.8 km NW of Emmaville along Breakfast Ck Track) towards Tungsten via Carpet Snake Ck track, 29°14'S 151°34'E, *A.L. Quirico 52, R. Coveny and R.O. Makinson*, 13.x.1990 (BRI, CANB, NSW, P *n.v.*); 0.55 km from Rangers Station along Mulligan Hut track, Gibraltar Range NP, 29°31'S 152°19'E, *M.F. Duretto* 672B, *P.G. Neish and I. Thompson*, 25.x.1995 (MEL, NSW); Buchanan SF 325, Mt Tingha, 30°06'S 151°16'E, *P.I. Forster 19485*, 2.viii.1996 (BRI, MEL); Watsons Ck NR, 30°48'S 151°03'E, *J.R. Hosking 1856, J.P., T.L. and G.R. Hosking*, 23.iv.2000 (CANB *n.v.*, MEL, NE *n.v.*, NSW *n.v.*); Alongside Mooraback Rd, Werrikimbee NP, 31°10'S 152°11'E, *J.R. Hosking 411*, 8.x.1991 (NE, NSW); NORTH COAST: About 50 m SE of Waihou Trig., Waihou SF Reserve, 30°05'S 153°03'E, *D.W. Harden 9302 and G.J. Harden*, 6.ix.1993 (CANB); CENTRAL WEST SLOPES: Mt Tayar (Tayan pic.), 17 miles [c. 27.2 km] c. SE of Rylstone, *E.F. Constable 5058*, 24.ix.1964 (NSW); Cherry Tree Hill, Mudgee, *Woolls s.n.* (MEL *2098475*); CENTRAL TABLELANDS: Army Rd to Gosper's Mountain, 8.2 km S of Mt Boonbourwa, 32°56'S 150°22'E, *D. Benson and D. Keith*, 21.iv.1983 (NSW); Dunns Swamp camping area, 32°50'S 150°11'E, *M.F. Duretto 690, P.G. Neish and I. Thompson*, 27.x.1995 (BRI, HO, MEL); western approaches of Dargan, 17 km E of Lithgow on Bells Line Rd, 33°30'S 150°16'E, *P.C. Jobson 3207*, 13.ix.1994 (CANB, MEL); CENTRAL COAST: southern end of Avon-Nepena Water Catchment area on Fire Rd No 2A on west facing ridge near Nepean River, 34°30'S 150°30'E, *C.A. Offord 13, P. Cuneo and E. Darley*, 26.x.1989 (NSW); SOUTH COAST: South Brooman SF, Shallow Crossing, Clyde River, c. 14 km NNE of Nelligen, 35°31'S 150°11'E, *L.G. Adams 2925*, 30.i.1973 (CANB); Dampier State Forest, c. 12 km (direct) WSW of Bodalla, 1 km from Nerrigundah settlement on Belowra Rd, 36°07'S 149°48'E, *R.O. Makinson 1221 and G. Butler*, 21.xi.1992 (CANB); Bodalla SF, Dignam Ck Rd, 2.5 km N from Rixons Hill Rd, 36°17'S 149°58'E, *N.G. Walsh 4049*, 13.x.1995 (CANB *n.v.*, MEL).

Notes: The juvenile leaves of *B. microphylla* are simple with serrate margins (e.g. *J.B. Williams s.n.*, 9.v.1965, NE *1149178*) and look remarkably similar to the leaves of *B. serrulata* (see above) and the fossil taxon, *B. harrisii* (see above). The *J.B. Williams* collection was part of a plant that was regrowing after fire.

The collection from Watsons Creek Nature Reserve (*Hosking 1856*) is unusual in that it has larger leaves (by 5 mm), leaflets (by 1 mm), petiole (by 3 mm), peduncles (by 2 mm), anthopodia (by 1 mm) and petals (by c. 2 mm) than other specimens. The collector

noted that the petals were 8–12 mm long. Further field research is required to determine if this variation warrants taxonomic recognition.

Boronia microphylla is easily distinguished from all other species of *Boronia* on the East Coast by having glandular tuberculate stems with the glands having a ring of hairs or tubercula, and the small pinnate leaves with elliptic to obovate to spatulate leaflets.

Horticultural notes on *B. microphylla* have been provided by (Elliot & Jones 1982).

Postulated hybrids: *Boronia microphylla* × *B. floribunda*: Postulated hybrids between *B. floribunda* and *B. microphylla* were noted by Beadle *et al.* (1972), Baldwin (1975) and Elliot and Jones (1982). Specimens of these, from the Blue Mountains (Elliot & Jones 1982), have not been seen by the author.

Distribution and ecology: *Boronia microphylla* is found from near Cottonvale, Stanthorpe and Girraween National Park (Qld) and south from Boonoo Boonoo and Tenterfield to Guyra on the Northern Tablelands, through the Wollomi NP, Blue Mountains and south to Bodalla (NSW) (Fig. 14). It grows in heath, woodland and forest on sandstone and granite derived soils. Williams (1980) noted that in Queensland the species grows on hummocks in or near very swampy areas. The known distribution, ecology and conservation status of this species in the Central Tablelands and Central Coast areas (NSW) are discussed by Benson and McDougall (2001). Flowering (May-)August-January; fruiting September-February.

Conservation status: In New South Wales the species is widespread, common, and well represented in reserves (see also Benson & McDougall 2001). In Queensland it appears to be rather rare and poorly collected. In that state it may be threatened with extinction in the Stanthorpe and Cottonvale areas though it is found in the nearby Girraween National Park (see also discussion under *B. inflexa* above).

Etymology: The specific epithet presumably refers to the small leaves of this species.

34. *Boronia galbraithiae* D.E.Albrecht, *Muelleria* 8: 24, Fig. 1d-f (1993). *Type*: VICTORIA: EASTERN HIGHLANDS: S of Cobbannah, *A.C. Beauglehole 77328*, 26.ix.1984 (holotype MEL *669258*; isotypes CANB *CBG8505280*, CHR *n.v.*, NSW, HO *90061*, MEL *669259*).

Boronia sp. aff. muelleri: J.H. Ross, *A Census of the Vascular Plants of Victoria, 4th edn*, 98 & 120 (1993).

Illustrations: D.E. Albrecht (*l.c.*); M.F. Duretto, *Fl. Victoria* 4: 163, Fig. 29d (1999). Erect, woody *shrub* to 2 m high, fennel scented, glabrous apart from flowers. *Branchlets* 4–angled with glandular tuberculate leaf decurrencies. *Leaves* imparipinnate, (3–)7–17-foliolate (on one specimen few leaves with lower leaflets ternate), entire leaf in outline 12–30 mm long, 5–14 mm wide; petiole 4–9 mm long, slightly glandular tuberculate; rachis segments 2–6 mm long; leaflets 2–9(–14) mm long, (0.5–)1–3 mm wide, oblanceolate to narrowly obovate, slightly discolorous, abaxial surface paler, dorsiventral, flat, margins glandular serrulate, tip obtuse to subacute, apiculate; lateral leaflets similar to terminal leaflets, longer or shorter. *Inflorescence* axillary, (1–)3–5(–15)-flowered, usually longer than leaves; peduncles 3.5–22 mm long, slightly glandular tuberculate; prophylls 1–2 mm long; anthopodium 2.5–7 mm long, slightly glandular tuberculate; metaxyphylls 0.5–1 mm long. *Sepals* ovate-deltate, 1–2 mm long, 1–1.5 mm wide, not obviously glandular, glabrous. *Petals* white to deep pink, 4.5–8 mm long, 2.5–3.5 mm wide, adaxial surface glabrous or glabrescent, abaxial surface glabrous though sometimes minutely ciliate, tip with slight subterminal apiculum. *Staminal filaments* pilose, glandular tuberculate towards apex; anthers glabrous, not apiculate. *Gynoecium* glabrous; style c. same length as stigma, c. 0.5 mm long; stigma entire, globular, scarcely wider than style. *Cocci* 3–4 mm long, 1.5–2 mm wide, glabrous. *Seed* black, 2–2.5 mm long, 1.5–2.5 mm wide. **Galbraith's Boronia.**

Representative specimens (10 specimens examined): **VICTORIA**: EASTERN HIGHLANDS:

Gippsland Lakes hinterland, Mt Difficulty on the upper SE slopes, 37°42'S 147°12'S, *D.E. Albrecht 1965*, 29.ix.1985 (MEL); Gippsland, c. 1 km NE of Mt Difficulty on the Insolvent Track, 37°42'S 147°12'E, *D.E. Albrecht 4968 and N.G. Walsh*, 27.iv.1992 (CANB, MEL, NSW); Jerry Rd, off Mt Ray Rd, near crossing of unnamed creek, c. 3.5 km c. E from Mt Difficulty, 37°43'S 147°13'E, *R.J. Fletcher s.n.*, 11.viii.1994 (MEL).

Notes: On one specimen (*Albrecht 1965*, MEL) some of the leaves have ternate lower leaflets, that is they are bipinnate, a very unusual feature in *B.* section *Boronia*.

Distribution and ecology: *Boronia galbraithiae* is restricted to a small area near Mt Difficulty in East Gippsland, Victoria (Fig. 14), where it is found in dry sclerophyll forest of *Eucalyptus sieberi* on spurs and upper slopes. The species is not found in Grampians National Park, western Victoria, as listed in Briggs and Leigh (1996). Flowering material has been collected in September and April, and fruiting material in April.

Conservation status: Albrecht and Walsh (1993), Briggs and Leigh (1996) and Walter and Gillett (1997) considered *B. galbraithiae* to be restricted in distribution and rare while Ross (2000) considered it to be vulnerable: a conservation code of 2VCi is appropriate.

Etymology: The species was named for Jean Galbraith (see Albrecht & Walsh 1993 for details).

35. *Boronia rhomboidea* Hook., *Icon. Plant.* 8, t. 722 (1845). *Type citation*: "Side of the Western Mountains, Tasmania. Ronald Gunn Esq." *Type*: TASMANIA, Side of the Western Mountains, *Ronald Gunn 1946* (lectotype, here designated, K *n.v.* [top specimens only, cibachrome MEL *2041269*, photograph AD *99803351*]).

Illustrations: W.J. Hooker (*l.c.*); P.H. Weston and M.F. Porteners, *Fl. New South Wales* 2: 235 (1991); P. Kirkpatrick, *Alpine Tasmania* 49, Fig. 20e. (1997); P.H. Weston and M.F. Duretto, *Fl. New South Wales* 2, 2nd edn: 275 (2002).

Erect or sometimes prostrate, woody *shrub* to 1 m high, will regrow from a rootstock. *Branchlets* not obviously glandular or slightly glandular tuberculate, leaf decurrencies absent, hispidulous to pilose, hairs to 0.25 mm long. *Leaves* simple, sessile or nearly so; lamina (3–)5–13 mm long, (1–)5–15 mm wide, broad-obovate to almost circular or rarely obovate, not obviously glandular, glabrous or occasionally ciliate if only at base, concolorous, isobilateral, palisade and spongy mesophyll not differentiated, flat, margins minutely serrate towards apex, often tinged red, apex obtuse. *Inflorescence* terminal and/or in axils of upper leaves, 1–3-flowered, longer than leaves, peduncles absent or sometimes present and then to 2 mm long; prophylls and metaxyphylls 2–7 mm long, 1–3 mm wide, obovate, persistent, similar to sepal in colour and texture but shape is intermediate between the leaves and sepals, ciliate or glabrous; anthopodia 1–2(–3.5) mm long. *Sepals* elliptic to oblong, 2.5–4.5 mm long, 1–2 mm wide, not obviously glandular, glabrous or sparsely ciliate, apex rounded to acute with tip attenuate. *Petals* white to pale pink, 5–8 mm long, glabrous, tip with subterminal apiculum. *Staminal filaments* glabrous, slightly glandular tuberculate towards apex; anthers glabrous, not apiculate. *Gynoecium* glabrous; style partially fused or rarely completely unfused; stigma distinctly 4–lobed, slightly wider than style, style and stigma together c. 1 mm long. *Cocci* 3.5–4.5 mm long, 2–2.5 mm wide, glabrous. *Seed* sometimes dull, grey/black with white flecks (probably due to transparent tubercula), 2–2.5 mm long, 1–1.5 mm wide. **Broad-leaved Boronia, Rhomboid Boronia.**

Representative specimens (c. 90 specimens examined): **NEW SOUTH WALES**: SOUTHERN TABLELANDS: northern Budawang Range, Upper Corang River, c. 15 km S of Nerriga, 35°15'S 150°03'E, *I.R. Telford 9536*, 5.xii.1982 (CANB, HO, MEL, NSW); Styles Ck, at firetrail crossing S of The Vines, N Budawang Range, 35°13'S 150°10'E, *J. Pickard 3320,* 31.i.1977 (NSW); Nettleton's Ck, 8.5 km NE of Mangarlowe, 35°21'S 150°00'E, *I.R. Telford 9621 and H. Hadobas*, 12.xii.1983 (CANB, HO, NSW); 2.3 km along track to Mangarlowe River from turn-off 4.2 km N

of 'Brooklyn' entrance on Back Ck Rd, 35°22'S 149°57'E, *M.D. Crisp 7930*, 24.1.1987 (CANB, NSW); Half Moon Wildlife Refuge, N of Mangarlowe, 35°23'S 149°57'E, *J.H. Ross 3408*, 1.xi.1989 (CANB, MEL); Mt Currockbilly, Budawang Range, 21 km ENE of Braidwood, 35°24'S 150°02'E, *A. Sikkes and I. Telford*, 7.xii.1973 (CANB); **TASMANIA**: CENTRAL HIGHLANDS: Blackboy Plain, 10 km N of Mathina, 41°23'S 147°53'E, *K. Williams s.n.*, 3.xi.1988 (HO *114163*); Near Dove River, c. 1 km N of Waldheim, Cradle Mountain, Lake St Claire NP, 41°38'S 145°57'E, *A.B. Court 1148*, 12.ii.1958 (HO); Cradle Mountain NP, 0.75 km NW of Waldheim on Houslow Heath, 41°38'S 145°55'E, *S.J. Forbes 1212*, 18.i.1983 (CANB, HO, MEL, NSW); Hill between Granite Tor and High Tor, 41°44'S 145°45'E, *A. Moscal 9419*, 21.i.1985 (AD, HO); Mt Roland, on plains, 41°28'S 146°16'E, *L. Rodway* s.n., 15.ii.1906 (HO *4721*); Gordon River, 42°37'S 146°23'E, *A.M. Buchanan 12942*, 28.i.1993 (HO, MEL); Longley, *M.E. Phillips 721*, 27.xi.1965 (CANB); Longley, 42°58'S 147°11'E, *A. Moscal 8600*, 13.x.1984 (HO); west of Margate, on coastal hills, 43°01'S 147°16'E, *J.W. Vickery s.n.*, 21.i.1962 (NSW, MEL *1058137*).

Notes: A collection of seedlings (*Phillips 721*) indicates that the characteristically shaped leaves of this species appear from at least the second pair of leaves after the cotyledons (on this sheet the first pair of leaves were missing). It is these broad-ovate to circular leaves with smooth margins that distinguish this species from all other species of *Boronia* in eastern Australia. The style and carpels of some specimens (e.g. *Moscal 8600*) are unfused: most unusual in *Boronia*.

Guilfoyle (1911) called this species the Clyde River Boronia, a name that has not been adopted. *Boronia rhomboidea* is not common in cultivation and horticultural notes are given by Elliot and Jones (1982).

Distribution and ecology: *Boronia rhomboidea* has an unusual distribution in that it is found disjunctly in the Southern Tablelands of New South Wales, chiefly in the Budawang Range, and in the highlands of Tasmania (Fig. 15). This distribution is reminiscent of that of *Philotheca virgata* (Hook. f.) Paul G. Wilson which is found disjunctly on Mt Imlay (NSW), Mt Kaye (Victoria) and is widespread in Tasmania. *Boronia rhomboidea* is found in heath and swamps on sandstone in New South Wales, and alpine and subalpine heath on a variety of substrates in Tasmania. The species was found to be self-incompatible by Weston *et al.* (1984). Flowering October-January; fruiting January-March.

Conservation status: The species is widespread and found in various reserves in New South Wales and Tasmania, and so is probably not under threat except local extinction.

Etymology: The epithet refers to the distinctive shape of the leaves.

Boronia section ***Valvatae*** (Benth.) Engl., *Nat. Pflanzenfam.* 3(4): 135 (1896)

Boronia section *Valvatae sensu lato* was subjected to a cladistic analysis by Duretto and Ladiges (1999) and was revised by Duretto (1999b) where a novel infrasectional classification was presented. Since then a number of new taxa and types (from PR and W) have become available to the author. These new taxa, *B. beeronensis*, *B. gravicocca* and *B. grimshawii*, are described and other relevant typifications are made below. *Boronia beeronensis* is placed in the *B. rosmarinifolia* A.Cunn. ex Endl. species-group (of *B.* series *Valvatae* Benth.) on the basis of its sessile, simple leaves that have planar stellate hairs on the abaxial surface. *Boronia gravicocca* is similar to *B. minutipinna* Duretto (E Kimberley, WA; Duretto 1997, 1999b) and is placed in *B.* subseries *Filicifoliae* Duretto on the basis of the sessile leaves with a large number of leaflets, leaflet shape and features of the seed (see discussion below).

The placement of *B. grimshawii* is problematic. It has multiangular stellate hairs, axillary inflorescences, valvate sepals and petals as is found in *B.* section *Valvatae*. It also has petals with a distinctly raised midrib which place it confidently within *B.* subsection *Valvatae* but it lacks the weak stellate hairs on the petals and there is no clear relationship to any species within this subsection. *Boronia* subsection *Valvatae* is a clade that has few apomorphies and an internal structure that is poorly supported and that mainly by homoplasious characters. The internal structure of the clade is also very sensitive to the

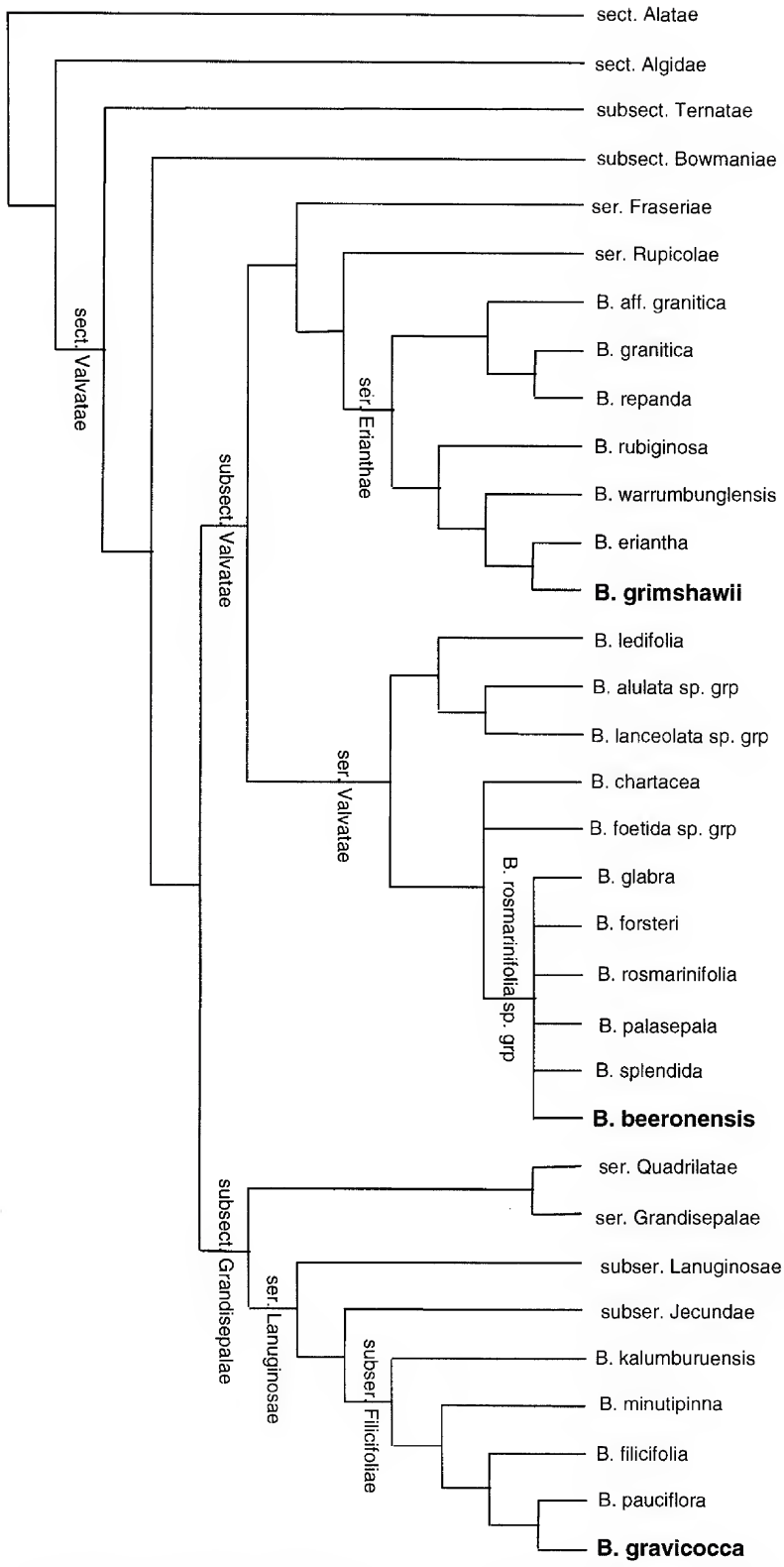

Figure 16. *Boronia* section *Valvatae*. Strict consensus tree of the 54 most parsimonious trees, each of 266 steps (see text for details).

addition and deletion of characters and/or taxa (see discussion in Duretto & Ladiges 1999; Duretto 1999b).

Superficially, *B. grimshawii* is similar to *B.* series *Erianthae* Duretto as both have glabrous or glabrescent leaves and lack secondary thickenings in the walls of the cells below the midvein, both being plesiomorphic features (Duretto & Ladiges 1999; Duretto 1999b). *Boronia grimshawii* and *B. eriantha* Lindl. also share glandular tuberculate stems, a feature not found elsewhere in *B.* section *Valvatae*. *Boronia grimshawii* also has slightly glandular tuberculate leaves as do *B. repanda* (*B.* series *Erianthae*) and *B. chartacea* (*B.* series *Valvatae*).

To determine the phylogenetic position of *B. grimshawii*, and confirm the placement of *B. beeronensis* and *B. gravicocca*, these species were scored for the data set of *B.* section *Valvatae sensu lato* that was analysed by Duretto and Ladiges (1999). All taxa and characters of that analysis were used following the methods as outlined for their third analysis. Additional characters (56 young branches, 0-not glandular tuberculate, 1-glandular tuberculate; 57 leaves, 0-not obviously glandular, 1-obviously glandular) were added. *Boronia algida*, *B. eriantha* and *B. grimshawii* were the only taxa to be scored as 1 for character 56, and *B. grimshawii*, *B. repanda* and *B. chartacea* were the only taxa scored as 1 for character 57. The data set was analysed using PAUP 4.03ba (Swofford 2000) and *B.* section *Alatae*, *B.* section *Algidae* and *B.* subsection *Ternatae* were used as outgroups.

The analysis produced 54 trees, each of 266 steps (Fig. 16). The strict consensus tree is exactly like the strict consensus tree of the third analysis published by Duretto and Ladiges (1999) except for the addition of the new species and relationships within *B.* subseries *Filicifoliae*. *Boronia grimshawii* is sister to *B. eriantha* and this clade is supported by one apomorphy: the presence of the glandular tuberculate stems (Character 56). *Boronia beeronensis* is added to the polytomy that is the *B. rosmarinifolia* species-group adding no further resolution. *Boronia gravicocca* is placed in *B.* subseries *Filicifoliae*. Interestingly it is sister to *B. pauciflora* W.Fitzg. in the 'most derived' clade. Unlike the other members of this subseries *B. pauciflora* has simple mature leaves (Duretto 1997, 1999b) and in the cladistic analysis of Duretto and Ladiges (1999) was the basal species of that subseries.

Boronia section ***Valvatae*** (Benth.) Engl. subsection ***Valvatae*** series ***Erianthiae*** Duretto, *Muelleria* 12: 42 (1999).

36. *Boronia grimshawii* Duretto, *sp. nov.*

A *Boronia eriantha* Lindl. foliis simplicibus, ad margine glandulosis differt; a *B. rubiginosa* A.Cunn. ex Endl. et *B. ruppii* Cheel caulibus glandulosis et tuberculatis differt.

Type: QUEENSLAND: BURNETT: Aranbanga Ck catchment area, 'Bronte Station', 25°43'S 151°30'E, *M.F. Duretto 1316, P.I. Forster and P. Grimshaw*, 14.ix.1999 (holotype MEL *2059447*; isotype BRI). (Figs 13 G-H).

Much branched erect, woody *shrub* to 1.5(–2.5) m tall. *Branchlets* quadrangular, glandular tuberculate, glabrescent or with a sparse to dense stellate indumentum between leaf decurrencies, becoming glabrous as they age, multiangular stellate hairs sessile, c. 8–20 rays; rays firm, straight, dull, white, 0.1–0.25 mm long. *Leaves* simple, 10–26 mm long, 4–10 mm wide, sometimes obviously glandular, new leaves with a sparse stellate indumentum mainly on midrib and margins, soon becoming glabrous or glabrescent; petiole 1–2 mm long, winged; lamina slightly lanceolate to elliptic to slightly oblanceolate, slightly discolorous, abaxial surface paler, dorsiventral, flat, margins

glandular crenulate, not or slightly recurved (revolute on drying), tip slightly to distinctly retuse, base attenuate, adaxial surface slightly glandular tuberculate, midrib raised slightly abaxially, without secondary thickening, midrib indented slightly adaxially. *Inflorescence* 1–3(–7)-flowered, cymose, though only 1 or 2 flowers maturing at the same time, shorter than leaves; peduncles 0.5–2 mm long, glabrescent with hairs concentrated between the decurrent bract bases; prophylls minutely unifoliolate, 1–3 mm long, to 1 mm wide; metaxyphylls minute, to 0.5 mm long; anthopodium 3–7 mm long, with a moderately dense stellate indumentum. *Sepals* ovate-deltate, 2.5–3 mm long, 1.25–2 mm wide, acute, not enlarging significantly as fruit matures, adaxial surface densely and minutely pilose, becoming glabrous towards the base, abaxial surface with a dense stellate indumentum. *Petals* pink to white, 6–10 mm long, 4–6 mm wide, enlarging slightly as fruit matures; adaxial surface glabrescent to sparsely simple pubescent; abaxial surface with a moderately dense to dense stellate indumentum. Antisepalous filaments 2–2.5 mm long, prominently glandular on the distal 0.5–1 mm; antipetalous filaments not or slightly glandular tuberculate towards apex, 1–1.5 mm long; anther-apiculum erect. Disc entirely within stamen whorl, glabrous. *Ovary* and style glabrous. *Cocci* c. 5 mm long, c. 2.5 mm wide, glabrous or with several simple and/or stellate hairs along the suture. *Seed* c. 4 mm long, c. 2 mm wide, black, shiny, at magnification tuberculate.

Additional specimens examined: **QUEENSLAND:** BURNETT: Head of Aranbanga Ck tributary in W side catchment, 25°43'S 151°30'E, *P. Grimshaw 2597 and T. Ryan*, 16.x.1996 (BRI, CANB, MEL); Aranbanga Ck catchment area, 'Bronte Station', 25°43'S 151°30'E, *M.F. Duretto 1313-1315, 1317, P.I. Forster and P. Grimshaw*, 14.ix.1999 (*MFD1313, MFD1315* – MEL; *MFD1314* – CANB, MEL; *MFD1317* – HO, MEL); Bronte, 9 km SW of Gayndah, 25°43'S, 151°30'E, *P.I. Forster PIF24845 & PIF24855, M.F. Duretto and P. Grimshaw*, 14.ix.1999 (*PIF24845* - BRI, MEL, NSW; *PIF24855* – AD, BRI, MEL, NSW); *ibid, P.I. Forster PIF25858*, 28.vi.2000 (BRI, MEL).

Notes: The recent discovery of this unusual and spectacular species highlights the need for further detailed survey work, even in well collected areas such as south-east Queensland (see also discussion under *B. rozefeldsii* and *B. beeronensis*). When the only known population of the species was visited by the author two other previously unknown and undescribed species were also collected, i.e. a *Zieria* (Duretto & Forster, in prep.) and an *Acacia* (Forster, BRI, pers. com., 2001).

Previously published keys for *B.* section *Valvatae* (Duretto 1999a, 1999b) can be corrected at couplets 17 and 67 respectively by inserting the following:

For Duretto 1999a:

17. Leaves petiolate 17a
17: Leaves sessile 18
17a. Stems smooth ..... ***B. keysii***
17a: Stems glandular tuberculate ..... ***B. grimshawii***

For Duretto 1999b:

67a. Stems glandular tuberculate ..... ***B. grimshawii***
67a: Stems smooth
67. Leaves with prominently raised midrib on the abaxial surface, lanceolate to elliptic, the apex acute (Qld) ..... ***19. B. keysii***
67: Leaves without a prominently raised midrib on the abaxial surface, oblanceolate or spatulate to elliptic, the apex obtuse (NSW) ..... ***12. B. rubiginosa***

Distribution and ecology: *Boronia grimshawii* is known only from an isolated 'jumpup' of duricrust near Gayndah, Queensland (Fig. 14). The species is found at and below the crest of the jumpup in *Lysicarpus* and *Eucalyptus* woodland where the species is locally common. The population consists of several hundred plants but surveys are required to determine the extent of the population. Flowering material has been collected in June, September and October, and fruiting material in September.

Conservation status: The only known population of *B. grimshawii* is large but apparently confined to one jumpup. This population is on private land and even though the area is unlikely to be cleared due to the nature of the soil a conservation code of 2V is appropriate. Further surveys along the jumpup, and nearby areas of similar geology and/or topology, are required to ascertain the size and number of populations.

Etymology: The species is named for Paul Grimshaw who first collected this species, and through whose extensive collections much has been added to our knowledge of the Queensland flora.

37. *Boronia rubiginosa* A. Cunn. ex. Endl. in Endl. *et al. Enum. pl.*, 16 (1837); *B. ledifolia* var. ? *rubiginosa* (A. Cunn. ex Endl.) Benth., *Fl. Austral.* 1: 314 (1863). *Type citation*: "Hunters-River. (A. Cunningh. 1827)". *Type*: N. S. Wales, Hills on Hunter River, *AC* [*Alan Cunningham*], 1827 (lectotype, here designated, W *n.v.* [photothek nr. *2948*, copy at MEL *2068458*]); N.S.W. Hunters riv. [*Alan Cunningham*] (isolectotype W *n.v.* [photothek nr. *2949*, copy at MEL *2068459*]); Hunter River ?, *A.C. Cunningham*, 1827 (isolectotype K *n.v.* [ex Linnean Society, cibachrome MEL *2044562*]); Mt Dangar [c. 32°21'S 150°29'E, New South Wales, Central Western Slopes], *A.C. Cunningham 60*, Aug. 1827 (probable isolectotype K *n.v.* [ex Allan Cunningham's Australian herbarium, cibachrome MEL *2044563*]).

Typification: The two collections made from the Hunters River by Cunningham (photothek nrs 2948 and 2949) are very similar in appearance and are more than likely to have come from the same collection and may even be from the same branch. The two specimens on the sheet numbered photothek 2949 appear to be from the proximal and distal ends of the larger specimen on the sheet numbered photothek 2948. The former sheet is labeled as 'Boronia rubiginosa Cunn. ms' giving credence to A.Cunn. being the authority of the name. The author has seen another sheet lodged at W (photothek nr. 2947) labeled 'Boronia rubiginosa C., Rocky Hills, N. S. Wales, 1825' (photographs MEL *2068460,* NSW) which was probably made on Cunningham's Liverpool Plains expedition (see Curry *et al.* 2002). The specimens from K cited above were called probable syntypes by Duretto (1999b).

38. *Boronia repanda* (F.Muell. ex Maiden & Betche) Maiden & Betche, *Proc. Linn. Soc. New South Wales* 31: 732 (1907); *B. ledifolia* var. *repanda* F.Muell. ex Maiden & Betche, *Proc. Linn. Soc. New South Wales* 29: 735 (1905). *Type*: Stanthorpe, Queensland, on the border of New South Wales, *J.L. Boorman*, July 1904 (lectotype NSW; isolectotypes BRI *AQ151273*, MEL *249152*, MEL *249153*, PR *528073*); Maryland near border of NSW, *E. Hickey* (residual syntype NSW; residual isosyntypes MEL *249148*, MEL *249191*); *fide* Duretto, *Muelleria* 12: 49 (1999).

[*Boronia ledifolia* var. *repanda* F.Muell. ex Domin, *Beitrage zur Flora und Pflanzengeographie Australiens* 838 (1926) [=*Bibliotheca Botanica* Heft 89: 284 (1926)]. *Type citation*: "Süd Queensland: Stanthorpe, *J. L. Boorman*, 1904." *Type*: Queensland: Stanthorpe, *J. L. Boorman*, 1904 (lectotype, here designated, PR *528073* [transparencies BRI, MEL *2068521*]; isolectotypes BRI *AQ151273*, MEL *249152*, MEL *249153*, NSW), *nom. illeg.*, *non B. ledifolia* var *repanda* F.Muell. ex Maiden & Betche. (In Duretto 1999b these isotypes are listed as isosyntypes).]

Boronia section ***Valvatae*** (Benth.) Engl. subsection ***Valvatae*** series ***Fraserorum*** Duretto, *Muelleria* 12: 51 (1999) (as *Fraseriae*).

39. *Boronia keysii* Domin, *Beitrage zur Flora und Pflanzengeographie Australiens* 838 (1926) [=*Bibliotheca Botanica* Heft 89: 284 (1926)]. *Type citation*: "Queensland: Lake Cootharaba, J. Keys 1909, in herb. meo." *Type*: QUEENSLAND: WIDE BAY: Lake Cootharaba, J. Keys *s.n.*, 1909 (lectotype, here designated, PR *528078* [transparencies BRI, MEL *2068555*]; isolectotype BRI *n.v.* [*fide* B. A. Lebler, *Queensland Agric. J.* 98, 619 (1972)]).

Boronia section ***Valvatae*** (Benth.) Engl. subsection ***Valvatae*** series **Valvatae** Benth., ***Boronia rosmarinifolia* species-group** *fide* Duretto, *Muelleria* 12: 78 (1999).

The *B. rosmarinifolia* species-group, less *B. glabra* (Maiden & Betche) Cheel, was subjected to a numerical analysis by Duretto (1999a). In this analysis four species were identified, *viz B. rosmarinifolia, B. splendida* Duretto, *B. palasepala* Duretto, and *B. forsteri* Duretto. A specimen from 'Beeron Holding' (Group E in Duretto 1999a) was isolated from other groups but was classified with *B. splendida* (Group C) on the basis of hirsute styles, narrow leaves and geography. The population at 'Beeron Holding' and a nearby population of *B. splendida* were visited in 1999 by the author and field observations and collected specimens indicated that the 'Beeron' Holding population was distinct and so is recognised as the new species, *B. beeronensis*, below. A corrected description for *B. splendida* and additional type information for *B. rosmarinifolia* are also provided.

Previously published keys for *B.* section *Valvatae* (Duretto 1999a, 1999b) can be corrected at couplets 21 and 63 respectively by inserting the following:

21a/63a. Petals (before fruit set) 8–15 mm long, 4.5–8 mm wide; sepals 4.5–6 mm long, 3–4 mm wide; styles pilose; cocci pilose.....***B. beeronensis***

21a/63a. Petals (before fruit set) 6–10 mm long, 3.5–5 mm wide; sepals 2.5–5 mm long, 1.75–4 mm wide; styles pilose or glabrous; cocci glabrous (seen only for *B. splendida*).....21/63

21/63. Leaves 1–2.5 mm wide, the margins strictly revolute; anther-apiculum usually large and reflexed; style glabrous or pilose; stellate hairs with rays to 0.1 mm long.....***B. splendida***

21/63: Leaves 2–6 mm wide, flat or margin recurved, sometimes revolute on drying; anther-apiculum absent or minute; style glabrous; stellate hairs with rays to 0.5 mm long.....***B. palasepala***

40. *Boronia rosmarinifolia* A. Cunn. ex Endl., *Enum. pl*: 16 (1837); *B. ledifolia* var. *rosmarinifolia* (A. Cunn. ex Endl.) Benth., *Fl. Austral.* 1: 314 (1863). *Type citation*: "Peel's Island, Moreton Bay. (A. Cunningh. 1824)". *Type*: Peels Is., Moreton-bay [Queensland, Moreton Bay, c. 27°30'S 153°20'E], *C. [Alan Cunningham],* 1824 (lectotype, here designated, W *n.v.* [photothek nr. 2946, copy at MEL *2059461*]).

Typification: The collector of the lectotype at W is signified only with a 'C' but given the other information on the sheet there is no doubt that this is the Cunningham collection referred to by Endlicher (1837).

Notes: No specimens of *B. rosmarinifolia* from Peel Island, apart from the type, have been seen by the author. Whether this is because there have been no recent collections made on the island or because the species is now extinct there is a question worthy of investigation. The species is certainly common on the mainland and on nearby sand islands (pers. obs.).

41. *Boronia splendida* Duretto, *Austrobaileya* 5: 278, Fig. 9G-L (1999). *Type*: QUEENSLAND: MORETON: Falls Ck, 4 km NW of West Haldon, 27°45'S 152°04'E,

P.I. Forster 4762 and L.H. Bird, 2.x.1988 (holotype MEL *1575271*; isotypes AD *99120272*, BISH *n.v.*, BRI *AQ429500*, CANB *CBG8908090*, K *n.v.*, MO *n.v.*)
Erect, much branched, woody *shrub* to 2.5 m tall. *Branchlets* not obviously glandular, without leaf decurrencies, with a dense stellate indumentum, becoming glabrous with age, multiangular stellate hairs sessile, with 5–10 rays, rays unicellular, free, firm, straight, 0.05(–0.1) mm long, glossy, smooth, white to yellow. *Leaves* simple, sessile, 9–50 mm long, 1–2.5 mm wide, linear to narrowly elliptic, not obviously glandular, strongly discolorous, abaxial surface paler, dorsiventral, margins entire, strongly revolute, tip obtuse. *Inflorescence* 1(–3)-flowered, with a dense stellate indumentum; peduncles 0–0.5 mm long, caducous with flower; prophylls minutely unifoliolate, 0.5–3 mm long, to 0.5 mm wide, with a dense stellate indumentum, or as leaves; metaxyphylls to 0.5 mm long; anthopodium 2–6 mm long. *Sepals* ovate-deltoid, 2.5–4.5 mm long, 1.75–2.5 mm wide, enlarging slightly with mature fruit, with tip acute, adaxial surface densely and minutely pubescent, becoming glabrous towards base, abaxial surface with a dense stellate indumentum. *Petals* pink to white, 6–10 mm long, 3–4 mm wide, enlarging to 12 mm with mature fruit, adaxial surface moderately pubescent with simple hairs, abaxial surface with a moderate stellate indumentum. *Staminal filaments* densely covered with stiff simple hairs abaxially and on margins below glandular tip; anther apiculum large, reflexed. *Ovary* glabrous; style glabrous (collections from Proston & "Mimosa") or hirsute. *Cocci* 5–6 mm long, 2.5–3 mm wide, glabrous. *Seed* black, shiny, c. 4 mm long, c. 2 mm wide.

Additional specimens examined: **QUEENSLAND**: BURNETT: Mundubbera, 1.5 km W of 'Mimosa' Homestead, 25°54'S 151°23'E, *P.I. Forster 2243*, ix.1985 (BRI); *ibid*, *M.F. Duretto 1322-1324, P.I. Forster and P. Grimshaw*, 15.ix.1999 (*MFD1322* – BRI, CANB, MEL; *MFD1323* – MEL, NSW; *MFD1324* – AD, HO, MEL); Stalworth Rd, north of Proston, 26°07'S 151°36'E, *T.A. Bean 10670*, ix.1996 (MEL); DARLING DOWNS: 4.8 km E of Tara turn off, and 5.3 km E of Kogan on Condamine Hwy, near dog fence, c. 27°02'S 150°46'E, *M.F. Duretto* 337-344, *M. Bayly and N. Marsh*, ix.1992 (*MFD337* - AD, BRI, CANB, MEL, NSW, PERTH; *MFD338* – BRI, CANB, MEL; *MFD339, 342-344* - MEL; *MFD340* - BRI, CANB, MEL, NSW; *MFD341* - BRI, MEL, NSW); 3 miles c. SE of Kogan, 27°02'S 150°46'E, *Smith and Everist* 817, x.1940 (MEL).

Notes: *Boronia splendida* can be distinguished from *B. beeronensis* by the strictly revolute and narrow leaves, smaller floral parts, and glabrous fruit. Northern plants of *B. splendida,* e.g. from near Proston and 'Mimosa' Homestead have glabrous styles while those from more southern populations have hirsute styles (see also discussion in Duretto 1999a): this variation warrants further field research.

Distribution and ecology: The species occurs in the Condamine-Kogan area, and north to 'Mimosa' homestead, c. 50 km south of Mundubbera (see Duretto 1999a, 1999b). Found on sandstone derived soils in *Eucalyptus* and *Acacia* woodland. Flowering March-November; fruiting material collected in November.

42. *Boronia beeronensis* Duretto, *sp. nov.*

A *Boronia splendida* Duretto foliis latioribus, sepalis majoribus et coccis hirsutis differt.

Type: QUEENSLAND: BURNETT: Beeron Holding, 26°00'S 151°21'E, *M.F. Duretto 1330, P.I. Forster and P. Grimshaw*, 15.viii.1999 (holotype MEL *2059467*, isotypes BRI, CANB, K, MEL *2059468*). (Figs 13 I-J).
Erect, much branched, woody *shrub* to 1 m tall and wide. *Branchlets* not obviously glandular, leaf decurrencies absent, with a dense stellate indumentum; multiangular stellate hairs with c. 5–15 rays; rays white to yellow, to 0.25(–0.5) mm long. *Leaves* sessile, 10–33 mm long, 2–4 mm wide, linear to narrowly elliptic, strongly discolorous, abaxial surface paler, dorsiventral, the margins recurved to revolute, acute, attenuate. *Inflorescence* 1(–3)-flowered, with a dense stellate indumentum; peduncles to 1 mm long;

prophylls minutely unifoliolate, 1–3.5 mm long, 0.5–1.5 mm wide, with a dense, stellate indumentum, or as leaves; metaxyphylls 0.5–1.5 mm long; anthopodium 3–4 mm long. *Sepals* broadly ovate-deltate, 4.5–6 mm long, 3–4 mm wide, acute to slightly acuminate. *Petals* 8–15 mm long, (4.5–)7–8 mm wide, enlarging slightly as fruit matures, adaxial surface with a moderately dense simple pubescence, abaxial surface with a moderately dense stellate indumentum. *Staminal filaments* densely covered with stiff simple hairs abaxially and on margins below glandular tip; anther-apiculum recurved. *Ovary* glabrous; style pilose. *Cocci* (mature not seen) c. 5.5 mm long, c. 3.5 mm wide, pilose. **Beeron Boronia.**

Additional specimens examined: **QUEENSLAND**: BURNETT: Beeron Holding, 5 km W of Toondahra Homestead, 25°58'S 151°20'E, *P.I. Forster 11202 and P.R. Sharpe*, 9.ix.1992 (BRI, MEL); Beeron Holding, 25°59'S 151°20'E, ix.1996, *P.I. Forster 19603 and T. Ryan* (BRI *n.v.*, MEL); *ibid*, *M.F. Duretto 1325-1327 & 1329, P.I. Forster and P. Grimshaw*, 15.viii.1999 (*MFD1325, MFD1329* – MEL; *MFD1326* - BRI, HO, MEL, NSW; *MFD1327* - AD, BRI, HO, MEL).

Notes: *Boronia beeronensis* can be distinguished from *B. splendida* by the wide leaves (1.5–4 mm wide; cf. 1–1.25 mm wide), large sepals (4.5–6 mm long, 3–4 mm wide; cf. 2.5–4 mm long, 1.75–2.5 mm wide) and pilose fruits; from *B. rosmarinifolia* by the large flowers and pilose fruits; and from *B. palasepala* and *B. forsteri* by the pilose style, large flowers and narrow leaves (see key above).

Distribution and ecology: *Boronia beeronensis* appears to be endemic to a granite range at Beeron Holding, Queensland (Fig. 15). The species is found growing on granite derived soils in *Eucalyptus/Corymbia* woodland at the base of hills to granite pavements with *Triodia* at the summit. The Beeron Holding is a local centre of endemism and other endemics include *Acacia eremophiloides* Pedley & P.I.Forst., *A. porcata* P.I.Forst., *Bertya beeronensis* Halford, *Newcastelia velutina* Munir, *Commersonia* sp. Beeron (Forster, BRI, pers comm. Jan. 2001).

Conservation status: A ROTAP code of 2V is appropriate. Only one hill was surveyed in 1999 and there the species was common from the base to the summit. Surveys are required to ascertain the extent of the species in the granite ranges.

Etymology: The specific epithet is derived from 'Beeron' Holding to which the species is apparently confined.

Boronia section ***Valvatae*** (Benth.) Engl. subsection ***Grandisepalae*** Duretto series ***Lanuginosae*** Duretto subseries ***Filicifoliae*** Duretto, *Muelleria* 12: 110 (1999).

43. *Boronia gravicocca* Duretto, *sp. nov.*

A *Boronia minutipinna* Duretto foliis glabratis, sepalis minoribus, petalis majoribus, petalis sepala superantibus et coccis glabris differt.

Type: THE NORTHERN TERRITORY: VICTORIA RIVER: Bradshaw Station, Fire Plot 3, 15°06'S 129°53'E, *C.R. Mitchell and J. Russell-Smith 2182*, 18.ii.1999 (holotype DNA *137377* [2 sheets]; isotypes MEL *286809*, MEL *286810*, NSW *n.v.*, PERTH *n.v.*). (Figs 13 K-M).

Erect, woody *shrub* to 50 cm high. *Branchlets* slightly quadrangular, becoming terete as they age, not obviously glandular, leaf decurrencies absent, with a sparse stellate/simple indumentum concentrated in strips between leaf bases, becoming glabrous as they age; multiangular stellate hairs with 6–15 rays; rays 0.1–0.6 mm long; simple hairs erect or haphazardly arranged. *Leaves* imparipinnate, (7–)11–33-foliolate, entire leaf in outline 8–40 mm long, 2–4.5 mm wide, sessile, glabrescent to glabrous; rachis segments winged, elliptic, 0.5–3 mm long; leaflets with a petiolule c. 0.5 mm long; terminal leaflet 1–3 mm long, 0.5–1.5 mm wide, lanceolate to oblanceolate; lateral leaflets 0.5–2.5 mm long,

0.5–2 mm wide, oblanceolate. *Inflorescence* 1(–3)-flowered, glabrous; anthopodium 5–11 mm long. *Flowers* yellow/white (collector's notes). *Sepals* deltate, 2–2.5 mm long, 0.75–1.25 mm wide, enlarging to 3–3.5 mm long as fruit matures, shorter and narrower than petals, acute, adaxial surface with a sparse simple and stellate indumentum, abaxial surface glabrous. *Petals* 3–5 mm long, 1–2 mm wide, enlarging slightly as fruit matures, adaxial surface with a moderately dense to dense stellate indumentum, becoming glabrous towards base, abaxial surface glabrous to stellate glabrescent. *Staminal filaments* bearing stiff bifid or stellate hairs below glandular tip, prominently glandular on the distal 0.5 mm; petaline anthers much larger than sepaline anthers; anther-apiculum erect, glabrous. *Ovary* glabrous; style pilose. *Cocci* (mature not seen) 5.5–6 mm long, 2.5–3 mm wide, glabrous. *Seed* black but mottled, shiny, c. 4.5 mm long, c. 2.5 mm wide.

Additional specimens examined: Known from the type material only.

Notes: *Boronia gravicocca* differs from *B. minutipinna* by having leaves with fewer leaflets ((7–)11–33-foliolate; cf. 17–35-foliolate), larger lateral leaflets (0.5–2.5 mm long, 0.5–2 mm wide; cf. 0.5–1.5 mm long, 0.5–1.5 mm wide), longer anthopodia (5–11 mm long; cf. 1–6 mm long), shorter sepals (sepals 2–2.5 mm long; cf. 3–4 mm long), longer petals (3–4 mm long; cf. 2.5–3 mm long), and sepals that are shorter than the petals. This species is unusual in *B.* subsection *Grandisepalae* in that the sepals are smaller than the petals and the erect simple hairs on the leaves. A form of *B. filicifolia* A.Cunn. ex Benth. (also *B.* series *Filicifoliae*) from Port Warrander has sepals slightly smaller than the petals (see Duretto 1997).

Previously published keys for *B.* section *Valvatae* (Duretto 1997, 1999b) can be corrected to accommodate *B. gravicocca* at couplets 2 and 49 respectively by inserting the following:

For Duretto (1997):

2a. Leaves (7–)11–33-foliolate, sessile, glabrous or glabrescent; petaline anthers much larger than sepaline anthers (W NT) ..... ***B. gravicocca***

2a. Leaves 1–25-foliolate, petiolate, glabrous to densely indumented; anthers c. equal (NT, Qld) 2

For Duretto (1999b):

49. Leaves sessile or petiole rarely to 2 mm long, (5–)11–55-foliolate; petals 2.5–5 mm long (NT, Kimberley)

49a. Leaves (7–11–)30–75 mm long, (3–)6–12 mm wide, (5–)15–55-foliolate leaflets, indumentum sparse to moderately dense; petals 2.5-3 mm long..... ..... ***B. filicifolia*** (Port Warrander form)

49a: Leaves sessile, 8–40 mm long, 2–4.5 mm wide, (7–)11–33-foliolate, glabrescent to glabrous; petals 3–5 mm long ..... ***B. gravicocca***

49: Leaves 1–15-foliolate or up to 25-foliolate and then leaves with a dense stellate indumentum, petiolate, or if sessile then ternate, petiole 1–30 mm long; petals 4–12 mm long (SW WA, Qld, NSW)

50. ...

Distribution and ecology: *Boronia gravicocca* is known from the type locality only, viz. Bradshaw Station, Victoria River region, in the north-west of the Northern Territory (Fig. 17). The species is found on a protected sandstone knoll with *Eucalyptus brachyandra* F.Muell., *Acacia froggattii* Maiden and *Acacia kelleri* F.Muell. where it is common (collector's notes; Russell-Smith & Yates, Bradshaw field training area fire monitoring database, Parks & Wildlife Commission of the Northern Territory, 2001). Flowering and fruiting material was collected in February.

Conservation status: The author has only seen the type collection of this species and it was noted as common when collected. The species has been recollected from the same locality in April 2000 (Brock, Parks & Wildlife Commission, Bioregional Assessment

Figure 17. Distribution of *B. gravicocca* (solid square).

Unit, pers. com., 2001). A conservation code of 1V is appropriate. Additional field studies are necessary in and around the type locality to ascertain the extent of the known population and if there are other populations.

Etymology: The specific epithet is derived from the Latin, *gravis* (heavy, weighty) and *coccus* (coccus), and alludes to the large fruit of this species compared to the perianth which give fruiting flowers an unwieldy appearance.

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Appendix 1

Voucher specimens for leaf anatomical data. Principle collector given only. All vouchers lodged at MEL. All material sectioned was removed from pickled collections. Note: *Boronia barkeriana* subsp. *barkeriana, B. barkeriana* subsp. *gymnopetala*, *B. citrata*, *B. deanei* subsp. *acutifolia, B. gravicocca, B. gunnii*, *B. hemichiton, B. inflexa* subsp. *grandiflora*, *B. inflexa* subsp. *montiazura*, *B. inflexa* subsp. *torringtonensis*, *B. nana* var. *pubescens*, *B. rivularis*, *B. yarromerensis* were not sectioned due to a lack of fresh or pickled material.

B. anethifolia (*Duretto 648, 680, 704*); *B. barkeriana* subsp. *angustifolia* (*Duretto 695*); *B. beeronensis* (*Duretto 1330*); *B. bipinnata* (*Duretto 325*); *B. citriodora* subsp. *citriodora* (*Duretto 558*); *B. citriodora* subsp. *orientalis* (*Rozefelds 162*); *B. citriodora* subsp. *paulwilsonii* (*Duretto 816*; *Walsh 4107*); *B. deanei* subsp. *deanei* (*Duretto 691*); *B. elisabethiae* (*Duretto 834*); *B. falcifolia* (*Duretto 250, 665*); *B. filifolia* (*Duretto 1360*); *B. floribunda* (*Duretto 692; Neish 42, 49*); *B. galbraithiae* (*Neish 131*); *B. grimshawii* (*Duretto 1313*); *B. hippopala* (*Duretto 851*); *B. imlayensis* (*Duretto 715*); *B. latipinna* (*Duretto 1274*); *B. microphylla* (*Duretto 92*); *B. montimulliganensis* (*Clarkson 5917*); *B. muelleri* (*Duretto 721, 728*); *B. nana* var. *hyssopifolia* (*Neish 39, 67*); *B. nana* var. *nana* (*Neish 547*); *B. occidentalis* (*Duretto 335, 1320*); *B. parviflora* (*Duretto 671, 835*); *B. pilosa* subsp. *parvidaemonis* (*Walsh 5377*); *B. pilosa* subsp. *pilosa* (*Duretto 841, 856*); *B. pilosa* subsp. *tasmanensis* (*Duretto 751*); *B. pilosa* subsp. *torquata* (*Fletcher 187*); *B. pinnata* (*Duretto 697*); *B. polygalifolia* (*Neish 32*); *B. rhomboidea* (*Duretto 772*); *B. rozefeldsii* (*Duretto 1469*); *B. safrolifera* (*Duretto 668*); *B. serrulata* (*Duretto 626*); *B. subulifolia* (*Duretto 698*); *B. thujona* (*Duretto 703*); *B. warangensis* (*Duretto 371*).

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